COMPUTERWORLD

HE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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NEWSPAPER

CW Photo by A. Dooley

Diane Ries demonstrates IBM's recently introduced 8100, which drew large crowds at Info '78 in Chicago last week. Conference coverage continues inside.

IBM Admits Moving Toward Independence Of Operating Divisions

By E. Drake Lundell Jr.
CW Staff

ARMONK, N.Y. – For the first time, IBM last week confirmed it is taking steps to make its operating divisions more independent – and, therefore, probably more competitive.

While the firm said it had decided not to set off separate subsidiaries "at this time," it admitted it "intends to continue to take steps to make its business units more self-sufficient."

It has been predicted [CW, Oct. 16] that IBM is moving toward becoming a General Motors-type of corporation in which the major company essentially operates as a holding company for separate but competing operating divisions.

In making the divisions more self-sufficient, an IBM spokesman said, the firm plans to give the divisions "more latitude" in developing and providing products, services and support.

The divisions also will be given more autonomy in product acquisition and will be allowed to make products they were previously required to purchase from other IBM units, he indicated.

IBM has been moving to this type of structure for some time. The recent announcement of the 8100 computer system [CW, Oct. 9] showed the firm had allowed its Data Processing Division (DPD) to enter what had formerly been the preserve of the General Systems Division (GSD).

At the same time, the firm allowed DPD to move into the domain of the Office Products Division (OPD) with the announcement of the 3730 office communications system.

Meanwhile, GSD is expected to enlarge its computer line to become more competitive with DPD. The internally code-named "Pacific" series of computers from GSD will range from the size of the System/3 up to systems with the power of a 370/158 when it is announced in the next few weeks, sources indicated.

The "GM" organizational strategy is a method of getting more revenues for the firm, industry analysts said.

Just as GM doesn't really care whether Pontiac or Chevrolet gets an order as long as it does not go to Ford, IBM will not care whether an order goes to DPD or GSD as long as it does not go to Honeywell, Univac or Amdahl, according to Robert Fertig, vice-president of the Technology Analysis Group at Advanced Computer Techniques Corp.

By having its operating divisions in direct competition, IBM apparently

(Continued on Page 4)

Acquire Business Skills, DP Managers Admonished

By Marcia Blumenthal
CW Staff

CHICAGO – Information managers are facing a crossroad in their careers; to avoid a dead end route full of ruts, they must gain the confidence of top management by acquiring sound business skills.

That was the advice given at the keynote session of the Information Management Exposition & Conference (Info 78) here last week.

To sit comfortably ensconced in the DP environment and let computer problems take precedence over business problems won't impress top management, keynoter William J. Mueller, vice-chairman of Arthur Andersen & Co., of Chicago, warned.

Instead, the DP manager must break with the past and become a catalyst, stirring action that will make those in the executive suite sit up and listen, Mueller stressed By acting as a catalyst, the information manager will enhance his status within the organization

One strategy for achieving status, Mueller maintained, is to provide training and management education. This training should not just be for the DP manager's own staff, but should encompass DP users and potential users within the organization.

By setting up training and education sessions in which operational person-

(Continued on Page 6)

IN DEPTH

"Why APL?" Because, for one thing, it can increase programmer productivity 300% to 500%, according to Robert E. Cook and Allen J. Rose. See this week's In Depth following Page 54.

Congress Passes EFT Bill, Protects Consumer Privacy

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. – Legislation providing consumer electronic funds transfer (EFT) protection and personal financial records privacy was passed last week in the hectic final hours of the 95th Congress.

The Fair Fund Transfer Act and Right To Financial Privacy Act are part of a comprehensive financial institutions reform bill approved by Congress in its marathon, 33-hour last day session

The legislation, entitled The Financial Institutions Regulatory Act, provides consumer safeguards for commercial EFT systems and limits access to financial records by federal authorities without due process of law

Congressional approval of the legislation came as a surprise to many observers here. Until the final day of this session of Congress, it seemed there was little chance for passage of any EFT or financial records privacy legislation.

According to a House Banking Committee staff member, there was just too much work left on bills covering those topics and not enough time to do it as Congress raced toward adjournment so its members could go home to campaign for reelection.

But at the last minute the provisions, part of several pieces of legislation on banking, were tacked onto a bill governing the interest rates financial institutions can offer their savings and checking account customers.

At 2:30 A.M Sunday morning, Oct. 15, the omnibus banking legislation

(Continued on Page 8)

Amdahl Adds Biggest CPU Offering IBM Compatibility

By E. Drake Lundell Jr.
CW Staff

SUNNYVALE, Calif – Amdahl Corp upgraded its mainframe line last week with the introduction of the most powerful system to date that is compatible with IBM software

At the same time, the firm announced an upgrade for its 470V/5, the 470V/5-II to bolster its lower level offerings.

The upper end machine – the 470V/8 – operates 20% to 30% faster in an interactive, high supervisor state environment than the 470V/7, the previous Amdahl top-of-the-line CPU, the firm said. It is almost 1.5 times as powerful as an IBM 3033 processor in a single CPU configuration, according to figures developed by *Computerworld*

Major contributors to this performance increase are improved internal cycle time, a doubling in the size of the machine's high-speed buffer and the use of prefetching techniques in the buffer, Amdahl said.

The machine cycle time has been reduced to 26 nsec from 29 nsec on the V/7, the company noted. The buffer size for the V/8 has been raised to 64K bytes, compared with 32K bytes on the V/7 and on the firm's V/6-II and V/5-II

The buffers operate in a two-cycle mode for a fetch time of 52 nsec on the V/8, the firm said. It added, however, that the buffer can be pipelined so each cycle is used for either a request for information or a return of information.

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Analyzed Decision Process

Nobel Winner Cited for DP Models

By Marcy Rosenberg
CW Staff

PITTSBURGH, Pa. — Dr. Herbert A. Simon, who was awarded this year's Nobel Prize in economics, earned his $165,000 prize for computer-based research in corporate decision making.

Simon, a professor of computer science and psychology at Carnegie-Mellon University here, used computers to simulate the ways people, especially those in large, complex business organizations, make decisions and solve problems.

"For example," Simon explained in a telephone interview last week, "we've studied the steps a trust officer might use to make decisions and tried to model his behavior on a computer to come up with certain rules of thumb."

Contrary to the economic theory that says a businessman sits in his office and has all the information he needs to decide how to be most profitable, Simon believes many executive decisions have to be made under uncertain conditions.

"Economics," he maintained, "has been kind of helpless in dealing with problems of uncertainty — that is, when alternate modes of action aren't known in advance and have to be discovered."

Long-Term Goal

His long-term research goal is to understand how decisions are made and what the psychological limits are, as a framework for developing ways to improve corporate decision-making.

Spanning many fields outside economics, Simon's experience includes work in business administration, applied mathematics, statistics, science theory and operations analysis. He cited past operations research work aimed at "building decision rules for inventory and production smoothing."

He received a doctorate in political science from the University of Chicago in 1943 and since 1965 has been a professor at Carnegie-Mellon, where he teaches an artificial intelligence course in the computer science department.

Discounts Fears of Depersonalization

Computers first interested him as a tool for simulating human behavior, Simon noted, discounting "as mostly nonsense" the fears that as computers take over more human functions, society will become less personalized.

"What computers do in industry," he said, "are the routine and repetitive functions that do tend to dehumanize people, leaving individuals with more time for activities that involve greater human interaction."

Simon plans to expand his psychological research work with computers to investigate the characteristic differences between experts and novices in such areas as physics and chess playing. "We are studying some of these differences to find out what makes an expert and how you get there from being a novice."

It would appear Simon already knows how to get there, although he was "astonished" to learn that he won the Nobel Prize. "A friend of mine who is a newspaper man in Stockholm phoned me before I got official word of the award and I thought it was a bit unbelievable."

Asked if friends treat him differently now that he has become an overnight celebrity, the Nobel recipient answered simply, "I hope not. Besides, they know me too well to take me seriously."

School Owner Guilty of Fraud

DETROIT — The owner of a computer training school here has been found guilty on four counts of fraud involving false claims for government funds under the Basic Educational Opportunity Grant [CW, May 29].

Harry M. Borcherding, owner of the Institute of Computer Technology (ICT) in suburban Oak Park, was found guilty of the criminal charges in a jury trial last summer.

In civil action a year ago, ICT was found guilty of submitting false claims to the government in the amount of $389,103.

Last month a judgment was made on that finding, requiring $786,206, double the amount involved, to be repaid to the government.

In both cases, Borcherding's counsel has filed motions to set aside the court's findings. Rulings on those motions could be made within a month.

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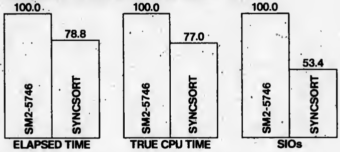

But performance aside—if that's possible in a software program—better ask yourself another question before you say "I do" to any DOS sort. How will it fit in if you move up to OS/VS?

Watch out if you try to make that journey with IBM sorting technology as a companion. Because the sad fact is that there is a "compatibility gap" between IBM's DOS and OS sorts. The features don't match!

SM2-5746, for example, has three called INCLUDE/OMIT, SUM and OUTREC. But no IBM OS sort has any one of those features.

So, if you try to migrate from DOS to OS, you may be upgrading your system, but at the same time you'll be downgrading your sort. And if you don't want to set aside a few months of your life for re-programming, then there's only one stark alternative: Divorce IBM and marry SyncSort!

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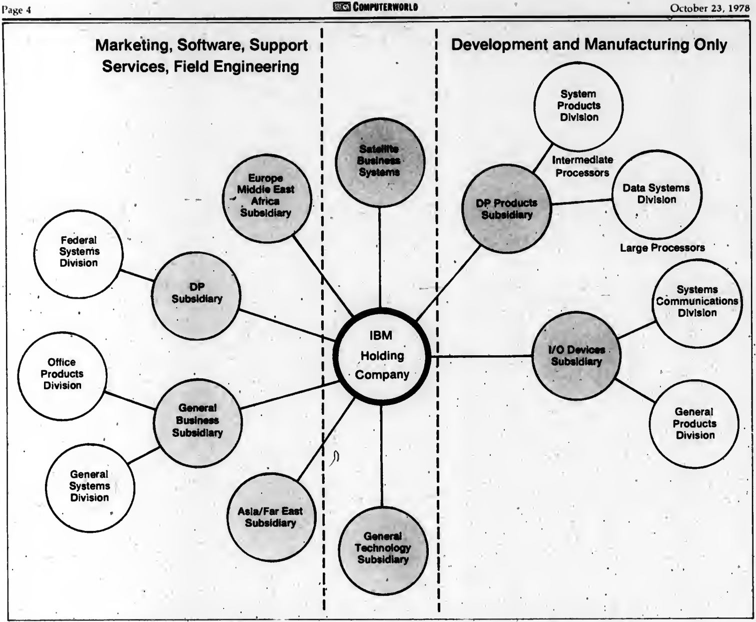
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Possible Scenario of Future IBM Organization Based on Data Supplied by Advanced Computer Techniques Corp.

IBM: Holding Company With Core Subsidiaries?

By E. Drake Lundell Jr.
CW Staff

NEW YORK — While IBM said last week it does not plan to set up separate subsidiaries "at this time" (see Page 1), it is clearly moving in the direction of greater divisional autonomy:

But what will the corporation look like when this gradual shift is complete?

On a conceptual basis, IBM will probably become a holding company with about eight "core" subsidiaries (see chart above), Charles P. Lecht predicted last week.

Lecht, president of Advanced Computer Techniques Corp., called the IBM reorganization an "unfolding supernova" and said it will happen either "by revolution or evolution."

Under the conceptual plan, the core subsidiaries could be placed in three classifications: subsidiaries that develop and manufacture products, subsidiaries that market and supply software, services and support for products and subsidiaries that are either in separate fields (Satellite Business Systems) or that serve the entire company.

One the manufacturing and development side, the Data Processing Products subsidiary would have two divisions: the Systems Products Division for intermediate-range systems and the Data Systems Division for large processors. This structure is already in place although it is not a separate subsidiary.

Another subsidiary in this area would be the I/O Subsystems subsidiary, consisting of the present Systems Communications Division for terminals and a General Products Division for other peripherals.

In a radical departure from past practices, at some point these manufacturing and development divisions may market their products on an OEM or even end-user basis to firms not under the IBM holding company umbrella, Lecht forecast.

Of the marketing, support and services subsidiaries, the present Data Processing Division would become the Data Processing subsidiary, the largest in the organization. It is already in place with the Federal Systems Division as an arm.

The General Business subsidiary, also already in place to some extent, would include the Office Products Division and the General Systems Division (GSD). It is not clear at this time whether GSD would continue to develop and manufacture its own products or whether that responsibility would be lodged elsewhere, Lecht said.

The other two expected subsidiaries are already entities as the Asia/Far East Group and the Europe/Middle East/Africa Group as part of the World Trade Corp. Instead of being Groups, these would also be spun off as subsidiaries, according to the scenario.

Satellite Business Systems, of which IBM is a 47.5% owner, will supply communications services and would be constituted as at present as a subsidiary.

The final major subsidiary would be General Technology, which would do basic research and supply components to the rest of the corporation as well.

At the same time, there would be other IBM subsidiary "fringe" areas that would not be the "core" areas of IBM business, such as the present Science Research Associates.

IBM Confirms Movement To Divisional Autonomy

(Continued from Page 1)

feels they will be more aggressive and problems of interdivisional cooperation will be reduced.

For example, in the past it was known that DPD salesmen resented having to work with GSD to configure distributed processing systems. IBM even had to change its compensation plan on such orders in order to placate the DPD sales group.

Now, with the 8100, DPD can go it alone in distributed applications, offering a complete system to users without having to use any GSD products. With the GSD Pacific announcements, that operating division will be able to offer a much wider range of computing options to users than in the past.

In addition, the separate subsidiary route opens up more management positions within the company as a whole and therefore more growth opportunities to management-level employees.

This might help IBM avoid situations like the middle managment exodus that it faced in the late 1960s, when a large number of managers left the firm when faced with dead-end career paths. Many left for jobs in the plug-compatible peripherals business, providing it with the management talent to attack the IBM base, the analysts noted.

IBM Booth Not Flashy One, But the 8100 Pulls 'Em In

By Howard A. Karten
CW Staff

CHICAGO – The IBM booth had no flashy displays or gimmicks to lure people in, but it nonetheless attracted a steady stream of visitors at the Information Management Exposition & Conference (Info '78) here last week. Potential customers and onlookers stood three and four deep, listening attentively as IBM sales representatives explained the 8100, on public display for the first time.

Buttonholed randomly, several people listening to IBM sell its wares seemed quite impressed with the recently announced system [CW, Oct. 9] and its possibilities — if reasonable delivery schedules could be obtained.

Michael Hepner, a programmer with the Air Force Systems Command at Wright-Patterson Air Force Base in Ohio, thought the display was "pretty impressive. We are looking at other systems for an acquisition management system, but this would be a good alternative to some we are studying.

"Our interest is in centralizing the data we work with to gain better control over it, while giving some DP power to the buyers," Hepner said. "A system like this would let buyers send summary information to us, freeing them to do the buying" and not the paperwork.

Diane Gade, equipment planning manager with the Hyland Division of Travenol Labs, Inc. of Costa Mesa, Calif., thought the system might be a good alternative for a remote processing system her company is studying: "We would be using distributed equipment for remote job entry and source data entry and possibly for some Cobol applications later down the line."

Three features of the 8100 were particularly attractive to Gade. "IBM is responsive to user requirements, the Cobol feature is certainly attractive and the ability to emulate 3270 equipment is a necessity," she said.

"This equipment looks pretty good for IBM customers," Eugene Starr of ESC Corp. in New Jersey said. "The only drawback I can think of is that the 8100 could deteriorate IBM's base of large users. But with IBM's service and support, I would think the system could be beneficial to most firms."

Ron Burquin of Abbott Labs in Chicago, for example, said Abbott is putting together a distributed order processing system and he is "fairly impressed with the system. IBM was out to give us an in-depth presentation, and it is a strong contender for the equipment we will select. The only problem is the delivery time — it will be tough to wait."

One of Burquin's colleagues at Abbott, Noel Tebo, said he, too, was impressed with the 8100: "Our [management information system] experts have given the system high marks."

One dissenting note was registered by "Joe from sunny southern California," who covered his name badge when informed that *Computerworld* was soliciting comments from passersby. Joe commented, somewhat dryly, that "IBM has at long last jumped on the bandwagon. In most cases, I think distributed DP is a buzzword — and a crock that people are interested in because they don't really know what it is and everyone's talking about it.

"I guess there are some good justifications for it, but in most cases that I have seen, it's basically mob psychology that's driving it."

CW at Info '78

James King displays IBM 8130 processor from behind roped-off area that was set up to prevent attendees from trying out the prototype system themselves. →

CW Photo by A. Dooley

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Business Skills Now a Must

(Continued from Page 1)

nel can discuss their informational problems, the DP manager acts as a consultant.

In many cases, Mueller noted, informational problems have a systems implication and the information manager can suggest developing a system to solve the particular problem. The presence of top management at these sessions, however, is a critical ingredient.

Long-Range Plan . . .

Another strategy information managers can use to convince management of their business acumen is to develop a long-rang systems plan that can be dovetailed to the firm's long-range business plan, Mueller said.

The long-range nature of this activity, Meuller believes, helps avoid system obsolescence when a system is finally installed after two years of planning."The information manager must integrate all systems in order to assess the impact of the one developed today on the one that is finally installed two years down the road," Mueller said.

He offered a six-point guide to DP managers for formulating long-range systems planning.

- The long-range planning project must be presided over by a steering committee consisting of top-level management. "Any long-range project requiring $3 million to implement is doomed unless you have top management involved," Mueller reasoned.
- The plan should be developed in conjunction with key users.
- Integrating the plan with the company's long-range business plans — three years to five years ahead — is critical.
- The information manager must make a candid assessment of the worth of present systems. "This is the most difficult task," Mueller said, "especially when you have just been telling everyone what a great system you have, when in effect it really isn't."
- After outlining major systems and projects that need to be developed over the next few years, the DP manager should then assign priorities to the projects.
- Finally, DP managers must estimate how much computer and communications capacity will be required to support the systems identified in the long-range plan.

'Blame the Manager' Syndrome

In addition to providing leadership in management education and systems planning, the information manager can cement his status within the company by scrutinizing the way DP projects are managed, according to Mueller.

Frankly, he said, the track record of managers in bringing projects in on schedule has been poor. And, whatever problems there may have been in this area in the past, Mueller observed, will get worse as systems projects get larger.

"Whenever projects have not gone well or when systems have had limitations; it has been construed as our failure, and our credibility with users and management has been damaged," Mueller maintained.

One reason for this may have been low time and money estimates. "Maybe we were afraid the project would not be approved if we told management how long we *really* thought it would take," Mueller admitted.

As information managers perform their catalyst role in the 1980s, they must make it their business not to lose touch with major project developments. Financial control and resource management are critical requirements, Mueller suggested, that will help managers with their role as catalysts.

For example, capacity planning based on daily utilization data, which is also projected into the future, allows the DP manager to warn management when new capacity is needed. At least one year's prior notice is needed, Mueller stressed.

The presence of multiusers and multisites within the organization makes this task difficult, but the information manager must deal with questions of daily efficiency.

Amdahl Tops Off CPU Line

(Continued from Page 1)

Logic has been built into the buffer to implement the prefetching technique. The logic predicts the next most logical consecutive data to be called into the buffer from main storage and then moves that data into the buffer, Amdahl said.

The buffer was also designed so frequently referenced data can reside in more than one area of the buffer for faster data access, the firm added.

Initial deliveries of the system are set for next September. A minimum configuration with 4M bytes of main memory and 12 channels will cost $3.28 million; a maximum configuration with 16M bytes of main storage and 16 channels will sell for $4.45 million.

The channels on the system can be used as either byte or block multiplexers, the firm said, noting channels can be switched from byte or block orientation at the console.

The V/5-II is basically a V/5 machine with a larger buffer — 32K bytes on the V/5-II compared with 16K on the V/5. The buffer operates in the two-cycle mode and has a fetch time of 65 nsec.

With the increased buffer size, the unit is said to be 10% faster than a basic V/5.

Upgrading in Field

Both the 470V/8 and 470V/5-II were designed for field upgrading with "no change in programming and minimal interruption of customer operations," Amdahl said.

The smallest Amdahl machine, the V/5, can be field upgraded to a V/5-II, a V/6 or a V/6-II, for example. An installed V/7 can be upgraded to a V/8.

Deliveries on the V/5-II will begin in January, Amdahl said. A CPU with 4M bytes of main memory and eight channels will run $2.1 million and a unit with 8M bytes and 16 channels will run $2.64 million.

All of the IBM 370 operating systems execute on the V/8 and the V/5-II; Amdahl supports MVS, VM/370, SVS, VS1 and MVT. The MVS/SE system control program also executes on the 470 line when Amdahl's MVS/-SE Assist program product is installed.

A Textbook Writer's Dream

Mutual of Omaha's Career Paths Standardized

By Marcia Blumenthal
CW Staff

CHICAGO – The personnel evaluation methods used by Mutual of Omaha to rate its DP personnel would probably send shivers of ecstasy up the spines of textbooks writers who specialize in personnel management.

These writers, so enamoured of standardized rating forms, would thrill to the management by objectives (MBO) form, tremble over the skills profile schedule and pant at the sight of the performance evaluation form used by the Nebraska-based insurance firm.

While no swooning or panting was evident during a seminar on human resources management here last week at the Information Management Exposition & Conference (Info '78). The overflow crowd was eager to learn more about Mutual of Omaha's personnel techniques that form the basis of career development for its DP personnel.

No Career Ladder

Mutual of Omaha's program, to a great extent, is based on the work done by John L. Fairfield, a partner and head of the Administrative Services Division of Arthur Andersen & Co. of Chicago. Fairfield led off the seminar with a discussion of the problems DP personnel face in attempting to attain management slots within a firm.

While the professional press is bannering such headlines as "From DP Roots, Top Management Is Reachable," companies do not, as a rule, offer an organizational path to the executive ranks for DP technical staff, Fairfield pointed out. In fact, he declared, the training provided DP professionals by companies is suspect, rarely providing instruction on the skills a DP professional needs to attain management positions.

The DPer who wants to get ahead, Fairfield said, is levels below the management information systems vice-president. Furthermore, that person cannot leave a hot project to take training to fill a new position.

The company, meanwhile, has hired experienced personnel from outside the company to fill management slots. DP professionals within the company know the newly hired personnel is highly paid but often possess fewer skills than employees already within the firm.

Consequently, Fairfield claimed, DP professionals tend to identify with the specific tasks they are working on, rather than identifying with the company itself.

"No matter whose payroll I'm on, I'm really working for myself" is a prevalent attitude among DP professionals, Fairfield noted. "The DP discipline outstrips all others in raw turnover figures."

Moving from the general to the specific, Mutual of Omaha executives John E. Chestnut, assistant vice-president of computer systems and programming, and G. Ronald Ames, second vice-president of computer data services, rounded out the discussion of their company's program.

Today, DP employees at Mutual of Omaha are considered associates, sharing with their supervisors a partnership in career pathing, Ames noted.

The career progression program is formalized and standardized, Ames said, consisting of about five critical components. A planning chart is the road map of an employee's career progession.

This way employees know the range of time they will have to spend in a position prior to a promotion and how many hours of training are available for attaining skills that permit progression to the next position level. Employees may move laterally, taking on jobs with more technical duties, or they may move vertically, rising to supervisory levels, Ames explained.

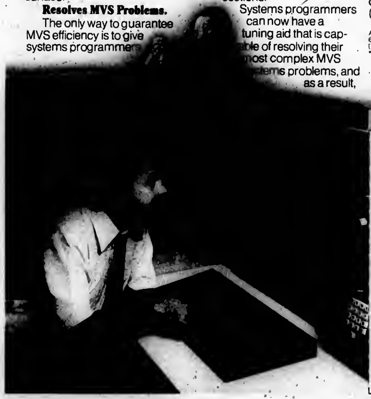
The skill rating component of the progression consists of 15 skills employees must master to become eligible for advancement. These skills – not all of which are necessary for advancement – are scaled from one to six, with a rating of four considered normal capability.

CW at Info '78

The skill matrix, another part of the formal assessment program, shows the critical or "driver" skills necessary to attain promotable status. However, employees know in advance which key skills they must have in order to be promoted, and training is available to develop those skills, Ames noted.

Yearly appraisals of each DP employee are made using MBO techniques, Chestnut said. Displaying the forms used in the MBO process, Chestnut pointed out that the procedure is broken down into people-related and job-related factors.

The people-oriented objectives include determination of career objectives and assignment preference. The job-related MBO component consists of specific objectives to be attained on the job during the upcoming year as well as an analysis of accomplishments.



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EFT Bill Passed By Congress Protects Privacy

(Continued from Page 1)

was passed by the House of Representatives, which had been in nonstop session since early the previous morning. The bill was shepherded through by Rep. Fernand St. Germain (D - R.I.) on a vote of 341 to 32.

Senate Passes Bill

Four hours later, the bill, under the leadership of Sen. William Proxmire (D - Wis.), passed the Senate by voice vote. The bill now goes to President Carter to be signed into law.

There is no known organized opposition to the legislation, and it is thought the bill is in no danger of presidential veto. The president has 10 days following the bill's approval by Congress to sign it. However, a White House spokesman said no date has yet been set for signing.

EFT Portion

The EFT portion of the legislation, called The Fair Fund Transfer Act, is an amendment to the Consumer Credit Protection Act. It provides "A basic framework establishing the rights, liabilities and responsibilities of participants in electronic fund transfer systems."

The bill defines EFT as "any transfer of funds...which is initiated through an electronic terminal, telephone instrument or computer magnetic tape." This includes point-of-sale transfers, automated teller machine transactions, direct deposits or withdrawals of funds and transfers initiated by telephone.

Financial institutions — banks, savings and loan associations, credit unions and "any other person who, directly or indirectly, holds an account belonging to a consumer" — will have to notify consumers of the "terms and conditions" of EFT services.

Such terms and conditions must include a clear statement of consumer rights, responsibilities and liabilities, the institution's safeguards against error and abuse and methods of correction for its systems.

Financial institutions will also have to provide "written documentation" of all EFT transactions at the time they take place and provide a "periodic statement" of an individual's EFT transactions. Statements will have to be mailed monthly or, if the consumer has used the EFT services on less than a monthly basis, at least every three months.

Error Resolution

Detailing error resolution procedures, the bill says a consumer will have 60 days after receiving his periodic statement to notify the financial institution an error has been made. The institution will then have 10 days to investigate and respond to the consumer's notification, which can be done orally or through the mail.

The legislation says, "If the financial institution determines that an error did occur, it shall promptly, but in no event more than one business day after such determination, correct the error..."

The financial institutions can, however, take up to 45 days to investigate an error complaint if the consumer's account is immediately credited with the amount of money alleged to be in error.

If a financial institution fails to follow the prescribed error resolution procedures, a court may award the consumer treble damages, according to a provision in the bill.

The legislation would require a consumer to report loss of his EFT card or means of access to the EFT system within two days after discovering the loss. The consumer then could not be held liable for more than $50 lost through an unauthorized transaction.

In any case, a consumer's liability can never exceed $500, and the burden of proof is on the financial institution to show that any EFT transaction was authorized.

The Fair Fund Transfer Act goes into effect 18 months after the bill is signed into law, except for the provisions on consumer liability and a section governing the issuance of transaction cards, which take effect 90 days after enactment.

U.S. vs. Miller

The financial privacy portion of the Financial Institutions Regulatory Act is a congressional response to the Supreme Court decision in U.S. vs. Miller, which held that a customer of a financial institution has no standing under the Constitution to contest government access to his financial records.

Basically, the court decided such records are the property of the financial institution and the customer has no constitutional privacy rights regarding them.

The Right to Financial Privacy Act is the end result of several bills introduced in Congress over the last three years to deal with the issues raised in the Miller case. In addition, several bills calling for financial records privacy were introduced folowing the final report last year of the Privacy Protection Study Commission, which recommended greater personal privacy rights in this area.

The bill passed last week provides specific legal avenues of access federal authorities must follow to obtain an individual's records from a financial institution. It also specifies legal action an individual may take to stop his financial records from being turned over to the government.

Authorized Procedures

The procedures authorized for obtaining financial records are customer authorization, administrative subpoena, search warrants, judicial subpoena and formal written request.

The government must notify an individual that his financial records are being sought and advise him of his rights under the law to attempt to keep his records from the requesting agency.

Within 10 days after receipt or 14 days from the mailing date of the mailing date of the subpoena; summons or formal written request, the individual would be able to file a motion in court to quash an administrative summons or judicial subpoena, or file an application to stop a government authority from obtaining the records through a written request.

Bill's Stipulation

An important section of the bill deals with the sharing of financial information obtained by the government. Records obtained by one agency cannot be "provided to any other government department or agency," according to the bill.

The legislation also contains a section stipulating that financial records obtained by a grand jury can only be used by the jury to decide whether to issue an indictment and to prosecute the crime for which the indictment is issued. The records must then be returned or destroyed by the grand jury and do not become a part of its records.

The Securities and Exchange Commission (SEC) was given a two-year exemption from the provisions of the bill, during which time the SEC will try to persuade Congress it should not be bound by the new legislation.

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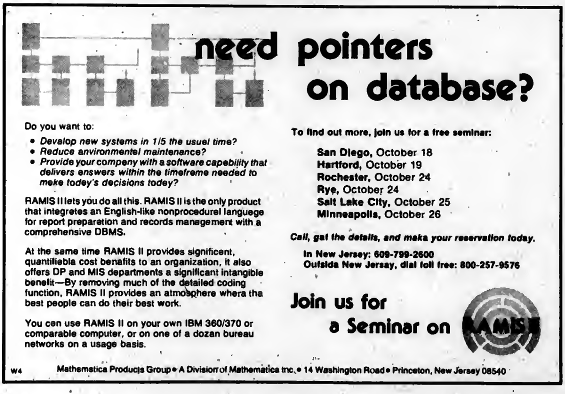

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Fancy Mini Not Always Best

Software Seen Making or Breaking System

By Tim Scannell
CW Staff

CHICAGO — Managers faced with the problem of choosing the best minicomputer system from an orchard of automated possibilities usually pick the shiniest apple and discover, too late, the inevitable worm.

A potential user's first thoughts when examining small business minicomputers should be directed beyond the neatly arranged panels and knobs of each machine to the system's software. According to Thomas McCarty, a partner with Arthur Anderson & Co., it is the software and its efficiency that will eventually determine the success or failure of a minicomputer installation.

McCarty expressed these views on minicomputers and software selection at the Information Management Exposition & Conference (Info '78) here last week at McCormick Place. He was one of more than 200 speakers and chairpersons who discussed, examined and offered advice on information management trends today and outlooks for the 1980s.

Software Selection

McCarty focused on the selection of application software rather than systems packages because, he said, the small business executive is more interested in processing a company's inventory than trying to understand the details of a minicomputer's operating system. However, operating systems should eventually be given some consideration, particularly since some software systems "may or may not be included in the price of the hardware."

There are basically two types of application software systems, McCarty said, the precoded packaged program and the heavily modified custom version.

Because of their virtual completeness, packaged programs offer several advantages to the "newborn" user. First, they shorten the development cycle — the time it takes to implement a minicomputer system. The precoded programs also relieve the manager of programming and debugging duties and eliminate the need for detailed design plan, McCarty explained.

Furthermore, packaged programs free the computer resources from the constraints of testing and allow production activities to continue. "By taking advantage of things already developed," McCarty noted, users are spared the trauma of "reinventing the wheel."

J. Steven Harrison, a treasurer with the Chicago-based Columbia Pipe & Supply Co., shared McCarty's disdain for "pioneering" a software system. "Software pioneering," Harrison said, "might get it for a little less money but it's not worth the aggravation."

Harrison outlined the transitional steps taken by his firm on the road from a manual to a computerized financial/inventory system.

Consultants, hired by the company at the onset, initially presented three alternatives to Columbia Pipe & Supply's president: stay manual; opt for a time-sharing or service bureau; or build an in-house computer system.

The in-house solution was selected, Harrison explained, because "We could see down the road that the other alternatives wouldn't provide relief."

The company eventually chose a Singer Co. on-line real-time computer system with eight CRTs, two printers and 8M bytes of storage, he said, but not without first learning a few lessons about DP and minicomputer acquisitions.

CW at Info '78

First of all, Harrison remarked, computer salesmen will do "anything to try to get their foot in the door." This includes lowering the price of the entire system by "skimping" on the hardware, which ultimately handicaps the user.

Vendors will also try to avoid "strict" installation schedules, fearing the contract will be canceled if the deadline isn't reached. Users should insist on specific dates of progress and completion.

Finally, as the system is being installed, the manager should try to put as many people as possible on the project so they can learn about the system from the ground up. Understanding just how the minicomputer fits together and what part each software and hardware piece plays is crucial to a successful transition, Harrison concluded.

Jim Freeman and Lou Zeller examine output from the California Computer Products, Inc. 1012 plotter at Info '78.

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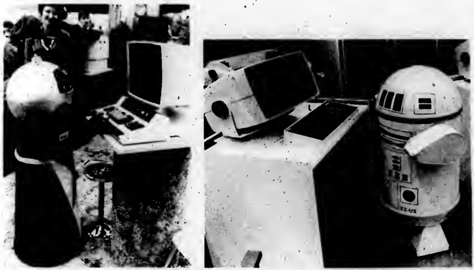
D.R. Curto watches as Russell Juleen tries a CRT on Qantel Corp.'s 1400 system.

Wang at Work



Cummins-Allison Corp.'s Orion and Future Systems, Inc.'s ZZ-U2 communicate with their "cousins," a Cummins-Allison Series 6400 and a Data General Corp. Dasher.

Bob Lieberman and Bob Brown examine Texas Instruments, Inc.'s Series 700.

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Info '78

CW Photo Feature
by
Ann Dooley

It may save space; but that's ridiculous!

In keeping with few new products being shown on the floor, Management Science America, Inc. featured its standby card tricks — but the crowd still loves them.

Racal-Milgo Corp. staffers discuss fine points of the System 185.

Ken Upcraft asks Jerry Wilson about Computone Systems, Inc. VIP Mode 600 system.

DDP Move Need Not Be Alarming, Users Told

CW at Info '78

By Howard A. Karten
CW Staff

CHICAGO — The growth of on-line systems and the reliability problems associated with running large mainframes have spurred the spread of minicomputers, according to Larry D. Woods, manager of distributed computing for John Deere & Co. of Illinois.

Speaking at a session on "Converting to Distributed Data Processing — Prerequisites, Planning and Control" at the Information Management Exposition Conference (Info '78), Woods cited several examples from his company's experience to illustrate his contentions that minicomputers and distributed DP (DDP) need not frighten or disrupt a user.

Woods told an overflow audience that in his view, there is an important and significant difference between distributed and decentralized systems. This difference lies in the control of and responsibility for installing and implementing these systems. Typically, a distributed system is installed and overseen by a central management information systems (MIS) department within a company, whereas a decentralized system is installed by a user department and is only loosely controlled (if any at all) by the central MIS department, he explained.

Suggesting that the term "minicomputer" is "derogatory," Woods offered this definition of "minicomputer": a system that is not a mainframe, has not been installed by a [central] MIS department, is not understood by an MIS department and is proliferating.

He cited his own company's experience in this regard. Deere decided in early 1975 to take a census of its minicomputers and counted 35. A year later, that number was up to 102, and by early 1977, it had grown to 250. The latest count, taken earlier this year, showed the company had close to 300.

In addition, the firm is using 10 IBM 370/168s, two 158s and a 3032.

Illustrating his remarks on the virtues of minis, even for a company that relies heavily on mainframes, Woods said Deere uses a mini to poll some 1,500 teletypewriters through which the company collects data. The $250,000 mini has been performing that task without a single failure since April. By contrast, IBM's Tcam software previously used was cumbersome and often required close attention and lengthy debugging when changes in the polling data were necessary.

The explanation for this superior performance, Woods believes, lies in the difficulties posed by software, particularly when several pieces of software interact with each other and with the hardware. Such interactions are often unpredictable. Furthermore, as the size of a CPU and memory increase, more software is added to a system to take advantage of the system's power as well as achieve an economy of scale.

The implication of this, according to Woods, is obvious: The less software running at one time on a system, the better the reliability. And the answer to running less software at one time is a smaller system.

Another example cited by Woods pertained to the functional off-loading of some of the mainframe's work, for example, by putting some of the program development editing functions into a minicomputer, a programmer could continue to do at least some program development work even if the mainframe went down.

Broad View of Small Systems

Urging the attentive audience to take a broad view when thinking about the benefits to be derived from minis, Woods cited the experiences of two individuals at Deere.

In one case, a manager involved in sales and marketing obtained an Apple Computer, Inc. personal computer to help him work with salesmen and sales projections. He learned to program it himself, Woods said, and routinely used it when discussing sales quotas and targets.

In another case, an employee working in the warehousing area used a Radio Shack TRS-80 to simulate the handling and storage of goods. He planned to use the system to sell management on the feasibility of running it on a larger mainframe, Woods said.

The significance of these examples, Woods hinted, was threefold: The employees involved became enthusiastic about solving problems they had, the work performed was useful to the company and the projects probably would not have been undertaken at all if a mainframe — and the associated expense, funding, justification, etc. — had been required.

At another company described by Woods, management literally doesn't know where all the minicomputers are, since they are on wheels and can be moved about. The systems, which are used by various engineering departments, are moved from department to department as the users engage in horse-trading with one another, swapping various services such as programing for computer time.

Despite these examples of successful use of minis, Woods said potential converts should be sure to be aware of all the potential pitfalls.

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Small Business Managers Warned:

Don't Be Lulled Into False Security by Minis

By Marcia Blumenthal
CW Staff

CHICAGO — Managers who lose perspective of the basic functions of management – control and planning – after installing a small business system are leaving themselves open to a variety of pitfalls.

Experts participating in a panel discussion here last week on small business systems said some of the pitfalls include inaccurate information, fraud and the installation of unnecessary computer equipment.

The benefit of receiving instant information lulls managers into thinking their small business systems are performing optimally and require no control checks, according to Richard I. Hoberman, management advisory services supervisor for Seidman and Seidman in New York.

Loss of control is a serious enough sin, but when compounded with lack of planning for future DP needs, small business managers may suddenly find unneeded mainframes or minicomputers on their doorsteps, Daniel C. Zatyko, director of distributed processing at Basic Four Corp., warned.

Accuracy Problem

Hoberman and Zatyko shared the podium during a session at the Information Management Exposition & Conference (INFO '78). Hoberman, concentrating primarily on the control function, told managers not to take for granted the accuracy of the figures supplied by their systems.

The systems have limits, he explained. In transaction processing, for example, the data entry function is in the hands of the employee. "Moreover, when employees control data entry, there is a greater opportunity to hide mistakes and perpetrate fraud and embezzlement," he pointed out.

To help control the accuracy of information, Hoberman advised managers to institute controls over data input, processing and output and the physical environment of the DP area.

When inputting data, Hoberman suggested that operators be required to check the data being entered against the data before them prior to going on to the next transaction. At that time, operators should initial the input documents.

Manually running a total on an adding machine and checking it against the total the computer spits out is an effective means of verifying figures, Hoberman said.

Processing controls include giving each application a code name and each operator a code number. Output controls, Hoberman continued, require the creation of an authorized distribution list for each report and the prohibition of duplicate report runs without management's approval.

Physical environment safeguards include not only protection from fire and water damage, but also adequate insurance for the equipment and the proper bonding of people responsible for data to cover losses from embezzlement, Hoberman stressed.

Critical to the control process is the documentation, using a flowchart, of the entire system: "Inadequacies in the flowchart will stare you right in the face," Hoberman said, and show you where system weaknesses exist.

Besides ensuring the accuracy of data, avoiding opportunities for fraud should be a prime concern for managers whose firms use small business systems, Hoberman said.

Hoberman raised two red flag situations which may be indicators of potential fraud.

"Avoid the 'one-man DP shop' where one person is responsible for programming and operating the data entry and data control functions. A really smart guy can steal you blind, and your accountant may never find the error.

"Segregation of duties and redundancy of knowledge are musts," Hoberman asserted.

CW at Info '78

Another warning flag should be hoisted, Hoberman said, when the small business manager encounters the "helpful software vendor who installs an auto-answer modem on your mini system so he can troubleshoot your problems from his office." To control this, the business manager should be able to turn off the modem.

Once small business managers have established control procedures and are using their systems to near capacity, the temptation to purchase additional hardware presents yet another pitfall. An alternative to expanding the small business system within a relatively small firm, Zatyko suggested, is the use of the network service suppliment.

This option permits the small business system user to occasionally utilize a mainframe through a communications line to a service bureau.

"Your mini may be spending up to 80% of its time processing a job that could be done more efficiently on a mainframe," Zatyko noted.

A service bureau can serve as a cen-

(Continued on Page 14)

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CW at Info '78

Dictionary Seen Vital to Distributed Data Base

By Brad Schultz
CW Staff

CHICAGO — No distributed data base (DDB) scheme should lack a good data dictionary, a session on distributed data processing (DDP) at the Information Management Exposition & Conference (Info 78) was told here last week.

Dictionaries define the types of data contained in the DDB and provide a structure and set of rules for manipulating this data, according to Maurice Blackman of Arthur Anderson & Co., an accounting firm that markets data base services.

Dictionary definitions specify what data looks like when input, stored and edited; this determines what data is accessible to a user or is needed in a DDB-generated report, Blackman explained

Generally, dictionaries result in better documentation and facilitate any modification of the DDB, he continued, adding that without the consistency dictionaries demand, any DDB would degenerate into chaos.

In the State of Illinois Office of Management Information and Communication, DDB users conform to a dictionary because dictionaries help minimize data redundancy and generally hold users to their software objectives, according to Larry C. Melton, who is manager of professional services for that organization. Dictionaries will eventually be incorporated into the operating systems implemented in DDP networks, he said.

Melton also told the session that data base administrators (DBA) should not become involved in daily data base or communications problem-solving at the expense of planning and coordination functions. The DBA should have ultimate responsibility and authority over virtually all aspects of the DDB.

Important considerations in establishing a DDB include application needs, user needs, geographic locations of member facilities, frequency of use for each facility and security privacy requirements, Melton pointed out.

The DBA should have a staff background, he continued, noting that desirable experience would encompass application planning, development processing, project management and data base design.

Duties, Responsibilities

The responsibilities of a DBA include assisting and monitoring such activities as system testing, documentation, standards promulgation, design and assessment of backup/recovery capabilities, evaluation of resource price/-performance trade-offs and general resource allocation, Melton said.

In the area of documentation, Melton maintained, the DBA should review the full gamut of paperwork and literature, including plans, schedules, manuals, specifications documents, design documents and program documentation.

Melton noted that not every DDP environment warrants a data base management system (DBMS) and that a multikey sequential access method should be used where a DBMS is unnecessary.

The DDB in Illinois that Melton administers handles 175,000 transactions daily and regularly employs IBM's IMS as well as multikey sequential software. This arrangement has three levels of distribution: host CPUs, transaction processors (small computer systems with CRT terminals dedicated to queries, remote job entry and data entry functions) and functional processors generally devoted to data entry.

Don't Be Lulled by Mini, Business Managers Warned

(Continued from Page 13)

tralized data base. For example, Zatyko said, the University of Alabama's hospital outgrew its IBM 380/158 but, rather than replacing the system with a larger mainframe, downgraded to three minis purchased for $28,000 each. The minis were installed in three separate profit center departments — general medicine, surgery and obstetrics and gynecology — where summary data, especially demographics, originated and was sent to the data base at the service bureau. There the information was integrated with other hospital data such as admission information, which the profit centers didn't collect.

However, small business systems users attracted to network service supplements must evaluate not only the costs of service bureaus, but most also scrutinize the operating software of their installed systems.

In addition to bisynchronous communications protocols, the system's software should have the capability of handling sign-on cards and file management, Zatyko said.

IBM 2780 and 3780 emulation is also required. A caveat here is that, while many mini vendors offer 2780 and 3780 emulation, the utilities vary in ease of use. A small system user, Zatyko suggested, would want a CRT utility to avoid having to punch cards.

Night-time use of Wats lines provides savings, and many service bureaus provide network connection in major cities at no extra cost. Small business users should figure the cost at $10 per hour for nationwide telephone hookups, he said.

On the user's side of the line, a modem rental would cost about $72 to $80 per month. The cost for the use of the service bureau's CPU and storage are not prohibitive, Zatyko said, if used in small chunks.

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CW at Info '78

Small-Scale 'Rerun' of NCC

Few Stars Shine at Lackluster Info Exhibit

By Tim Scannell
CW Staff

CHICAGO — Show floor scenes at the fifth international Information Management Exposition & Conference (Info '78) here last week were slightly reminiscent of an old, late-night television movie — nostalgic and, for the most part, very colorless.

The exhibits were basically the same as those at the National Computer Conference (NCC) in Anaheim, Calif., last June 6, but on a much smaller scale. However, there were a few promising stars amid the nearly 200 exhibitors present at the four-day extravaganza, which took place at McCormick Place.

Qantel Corp.'s Booth, decorated with flowers and various pieces of shrubbery, was designed to highlight the firm's Advanced Memory System (AMS) and three new computer systems: the models 970, 1450 and 1450-2. These upgrades of the 900 and the 1400 series feature a high-speed processor that can handle data up to four times faster than the previous models, a spokesman said.

The memory of the three recently introduced systems starts at 128K char. and can be expanded in 32,000-char. steps to more than 1M byte, whereas the previous models are limited to a maximum of 128K char.

The 970 and 1450 are compatible with all of Qantel's existing hardware and software and feature a single-board processor design, allowing for more efficient back-plane utilization, the spokesman continued. In addition, the firm has replaced 8K plug-in memory modules with 32K-byte boards and the memory access time has been speeded up from 1.1 microsec to .95 microsec.

The basic 970 system, including 128K-bytes of total memory, a CRT terminal, a 12M-byte fixed/removable disk drive and a 50- to 100 line/min printer, costs about $35,900. The 1450, with 128K-bytes of memory, CRT, 12M-byte disk drive and 300 line/min printer is tagged at approximately $44,500, while the 1450-2, with two terminals, a 25M-byte drive, printer and magnetic tape drive costs around $69,900.

Deliveries are expected to begin in the first quarter of 1979 from the firm

(Continued on Page 18)

Opportunity Not Missed

CHICAGO — While the Information Management Exposition & Conference (Info '78) was taking place here last week in one part of cavernous McCormick Place, systems of another sort were being built next door, where the Building & Construction Exposition & Conference was held.

Only two computer-related companies used the occasion to try to sell builders on their products: Computer Systems Corp. of Indianapolis had a Digital Equipment Corp.-based system for estimating and administrative work and Burroughs Corp. noted the virtues of its B80 and its Contractor Management System.

Several exposition attendees said they were interested in using computers to try to control their costs. At the same time, however, most seemed unaware of or not interested in the Burroughs display.

One contractor, however, Bruce Damaske, president of King's Men Construction, Inc. of Salem, Ore., listened avidly as the Burroughs representative manning the booth explained what the system could do for him.

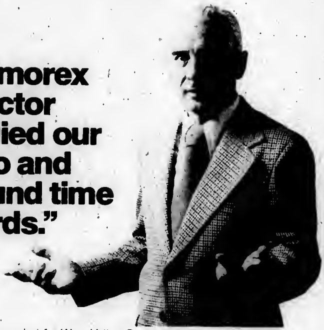
"One of the problems is that we sometimes question whether the salesmen understand the problems of our business — if they have none available, they are usually pretty quick to explain how an existing system can be adapted. But that's not what I'm after," Damaske said.

"I am very interested in these systems, but the problem is trying to decide which system to get — I have seen several others, and there are so many now that it can be difficult," he noted.

Damaske said his interest in DP had been stimulated only in the last two or three years as prices dropped significantly.

CW Photo by A. Dooley

Carolyn Dodd demonstrates Addressograph-Multigraph Corp.'s Amtext 425 system.



"Adding a Memorex 6400 Semiconductor Memory multiplied our capacity by two and cut turnaround time by two-thirds."

—Gunter Klein

Mr. Klein is Manager of Data Processing for West Valley Community College District in Santa Clara and Saratoga, California. From its two campuses in the heart of the Santa Clara Valley, home of the semiconductor industry, the district serves over 23,000 students. Approximately 500 of them are enrolled in courses involving direct use of the college's data processing system.

"Before leasing Memorex's 6400 Semiconductor Memory for our System 370/135; we had a total capacity of 512K and our response time averaged 15 seconds. Now our students get a response within 3 to 5 seconds with the addition of the new memory and a new T.P. monitor."

Besides providing for student needs, Mr. Klein's department also serves the college's administrative, management and record-keeping needs with 32 on-line CRTs,

"Since installing the 6400, all of our inquiries are being answered more quickly and efficiently."

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Communications Products Let Users Alter Features

By Ronald A. Frank
CW Staff

CHICAGO — Data Communications products with user-alterable features were among the devices featured by firms at the Information Management Exposition & Conference (INFO '78) here last week.

Racal-Milgo Information Systems, Inc. of Miami demonstrated the System 185 network diagnostic controller which features microprocessor-based monitoring and diagnostics and permits management of networks from the user's central site.

The 185 allows line and modem control of IBM 3600 finance communications loop systems using Racal Milgo 1,200- or 2,400 bit/sec loop modems. The 185 provides the DP center operator with an indication of network problems and can also be used for fault isolation at unattended sites.

In addition, the system gives the user the ability to switch from primary to secondary modems at unattended remote sites, a spokesman said.

A 16-channel System 185 costs $10,900 or $43/mo on a 30-month lease, the company said.

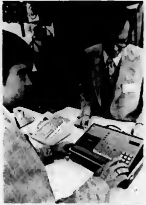
One of the units that operates with the 185 is the Remote Modem Transfer Switch, which is installed at the remote site and allows automatic switchover to a backup modem when the primary modem malfunctions. It is priced at $980 or $30/mo on a 30-month lease.

The Racal-Milgo loop modem series (LMS) provides users of IBM 3600 finance terminals with the ability to operate on-site loops at either 1,200- or 2,400 bit/sec. The Model 12 LMS costs $2,110 or $76/mo, while the Model 24 LMS costs $2,650 or $90/mo, both on a 30-month lease, the company said.

Clustered Terminal

Teletype Corp. of Skokie, Ill., demonstrated the first working prototypes of its Model 4540 microprocessor-controlled clustered intelligent terminal. The terminal, which features IBM 3270 compatibility in certain models, was demonstrated in a synchronous, multipoint, private-line configuration designed for inquiry/response transactions.

The 4540 will be priced at about $3,350, depending on the configuration, and first deliveries are scheduled for the first quarter of 1979, a spokesman said.



CW Photo by A. Dooley

Gene Piatkowski of AT&T tries out microprocessor-controlled customer access unit of the firm's Horizon system.

CW at Info '78

Teletype also showed a forms access printer on its Model 40 CRT series. Designed for printing tickets, receipts and similar documents, the printer is priced at $3,800 in the receive-only version with delivery in about 150 days, a Teletype spokesman said.

Computone Systems, Inc. of Atlanta showed its terminal-in-a-briefcase designed for accessing insurance and other data that requires interaction with a large data base. Using plastic templates, the user preprograms a series of 64 thumbwheel switches, which set up the required input conditions.

Called the Micro-VIP 600, the terminal can produce hard-copy CPU using a built-in printer. Audio response output from the CPU can be handled via a built-in speaker system. The intelligent terminal costs $2,850 with lease plans available, the company said.

Atlantic Research Corp. introduced a fallback switch system that allows the user to switch to an alternate phone line or CPU port when malfunctions occur. Designated the FBS-1-1CM, the system is priced at $2,728 and is meant for use in conjunction with other test equipment supplied by the firm. The company is located in Alexandria, Va.

AT&T demonstrated its Horizon system, which provides programmable key set capabilities to users with 20- to 60-line installations. One of the key features of the Horizon is a user-programmable customer access unit controlled by a microprocessor.

By altering firmware in the access unit, a user can dynamically reconfigure the stations in the system without having to call for assistance from phone company craftsmen, an AT&T spokesman explained.

The Horizon system has been used on an experimental basis in the Louisville, Ky., area since May 1977, but Bell System operating companies in most areas are expected to file tariffs for the system "by the end of 1978," AT&T said.

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Interactive System Tops Line

NCR 8270 Leads Parade of Hardware Debuts

By Howard A. Karten
CW Staff

CHICAGO — An addition to NCR Corp.'s 8200 family led a generally short parade of product introductions at last week's Information Management Exposition & Conference (Info '78) here as exhibitors concentrated on demonstrating products introduced at previous DP shows.

Minicomputers, mid-scale systems and distributed systems seemed to predominate at Info, with few large-scale systems in sight. The robots Orion and Klatu, seen at last June's National Computer Conference, have not yet decided what system to buy — both turned up on the Info floor.

NCR unveiled its 8270 interactive system, topping off its 8200 family. The unit includes a CPU with memory ranging from 128K to 512K bytes, 54M to 324M bytes of fixed and removable disk, a variety of printers with speeds ranging from 125- to 900 line/min, three to 24 CRTs and other peripherals such as flexible diskettes, magnetic tape cassettes and magnetic tape drives.

The unit is said to use NCR's range of interactive multiprogramming application programs and operate as a free-standing unit or linked with other systems in a network configuration. Compilers available with the 8270 include Cobol 74, a spokesman said.

A basic system with 128K bytes of memory, three CRTs, a 125 line/min matrix printer and 54M bytes of disk is priced at $62,305 or $1,633/mo on a five-year rental. First deliveries of the system will be made in October 1979, the spokesman said.

Printer Debuts

Decision Data Computer Corp. of Horsham, Pa., used the occasion to introduce its 6600 series of line printers, available in speeds of 300-, 450-, 600-, 900 and 1,600 line/min. The 6600 family can print forms ranging up to 16.75 in. wide on six-part forms, with a spacing of 10 char./in., a spokesman said.

The printers can replace IBM System/34 and Series/1 printers.

Prices on the units range from $13,750 for the Model 6606-34 to $41,175 for the Model 6615. Rental prices are $390 and $1,255/mo, respectively, on five-year-leases.

Also introduced by Decision Data were the Model 6540 serial printer and the 3240 printer terminal. The two printers feature a 9 by 7 dot matrix and a serial/impact printer method, the spokesman said.

Two interfaces, an RS-232C and a 20 mA current-loop interface, are available with the units which operate at 110-, 300- or 1,200 char./sec.

Standard features on the terminal include bidirectional printing, a 96-character set, 512-character internal buffer and double-size character set. A 13-key numeric keyboard is optional on the 3240.

The Model 3240 costs $2,850 and the Model 6540-2 printer costs $3,975.

NEC Information Systems, Inc. also introduced a printer, the Model 5510c Spinwriter. The 55 char./sec system can print optical character recognition (OCC) quality characters, a spokesman claimed, at a maximum line width of 163 characters (for 12 char./in. size) or 136 columns for the more standard 10 char./in. size.

A Centronics Data Computer Corp. type of interface comes as standard with the printer, which sells for $2,750 from the Lexington, Mass. based company.

C. Itoh Electronics, Inc. also introduced a printer, the Model 820, featuring an 80-column, dot matrix impact printer mechanism. The 84 line/min, 5 by 7 dot matrix device accepts paper up to 9.5 in. wide, using a sprocket paper feed mechanism.

A maximum of one original and three copies can be printed on the $300 device, a spokesman for the Los Angeles-based company said.

Qume Floppy

Qume Corp. joined the ranks of floppy disk drive manufacturers with its Datatrak 8, a double-sided, double-density unit. The device is said to be fully compatible with the IBM System/34, 3600, 3740 and System/32 drives, accepting a Diskette 2D or equivalent disk.

CW at
Info '78

The drive has a transfer rate of 500K bit/sec with a capacity of 1.2M byte/-disk (IBM format), a spokesman said, and sells for $755 from the company in Hayward, Calif.

Anderson Jacobson, Inc. introduced its AJ 510, a 7 by 7 dot matrix terminal with a full 128 character Ascii set and 40-character graphics set. A 15-in. screen on the unit can display 24 lines of 80 columns each, according to a spokesman.

Asynchronous data is transferred from the unit via its two RS-232C ports directly to a printer through a modem. Data rates on the unit are switch-selectable from 110- to 9,600 bit./sec.

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Few Stars Light Up Show's Colorless Floor

(Continued from Page 15)

in Hayward, Calif.

Basic/Four Corp. introduced both a word processing enhancement and a forms entry system (FES) for its System 610 and 730 minicomputers. Both systems allow word processing and file management/communications to continue concurrently with regular DP functions using the same data base, a representative explained.

The Dataword word-processing system uses a "menu-driven", tutorial approach to assist the user. The software/-hardware package features not only text editing capabilities but also a work measurement system that enables the user to monitor the operations.

The word-processing enhancement can draw on a large hard-disk storage capacity using 35M- or 75M-byte spindles, which provides for a large volume of text storage, the spokesman said. Dataword also features a "sub-menu" program that lists specialized document forms and a view directory control that allows users to purge unwanted files.

Block move, another system feature, lets the user insert a page or a part of a document on file elsewhere into the document being typed, the spokesman added.

The firm's other introduction, the FES enhancement, features concurrent processing capabilities and operates in a "preprogrammed environment," the spokesman pointed out.

The operator initially defines each field to be entered and the constraints on that field. Information is input via keyboard and the data files created according to the conditions previously specified by the user. As the data is captured, it is input validated and can also be password protected, the spokesman noted.

The forms entry system also has a multiterminal source data collection capability, fast screen format generation and built-in verification and update controls.

Dataword is priced at $12,500 including a text display terminal, a word processing printer, controlled and software.

Qume Diskette Drive

Qume Corp. of Hayward, Calif., took advantage of the Info show to announce a dual-sided, double-density diskette drive that can store 1.6M bytes of unformatted data and 1.2M bytes of formatted information. The IBM-compatible drive features a track-to-track access time of 3 msec and an average access time of 91 msec, a spokesman for the firm said.

Datatrak 8 can also attain a transfer rate of 500k bit/sec and the disk drive's standard options include file protection and a programmable door lock.

All of the drive's components are modular in construction and aligned on a single-piece baseplate, the spokesman stated. Index sensors, file-protect sensors and motor are in fixed locations, which reportedly minimizes adjustment requirements.

Datatrak 8 deliveries are scheduled for the first quarter of 1979 and the unit costs approximately $755.

Datagraphix, Inc. of San Diego, Calif., demonstrated a prototype of its Model 132B CRT terminal, an upgrade of the 132A.

The 132B is similar to the A model in that it is microprocessor-controlled and RS-232C compatible. It forms 132 char./line.

However, the new model features an expanded keyboard with 12 function or "sequence string" keys, an 11-key numeric pad and 27 control keys. The terminal also has several page and forms mode functions that control the number of characters per line, lines per page and number of pages, as well as the memory size allocation.

In addition, the 132B has a field-protect option that identifies protected fields by producing them in dimmer characters.

The Datagraphix, Inc. upgrade, scheduled for delivery after Dec. 1, is priced $500 higher than the 132A for $4,450.

Finally, NEC Information Systems, Inc., of Lexington, Mass., displayed its line of microprocessor-controlled printers. The Trimliner series is available in either a 300 line/min or 600 line/min model and both print 136 columns at 10 char./in.

The 300- and 600 line/min printers are priced at $5,175 and $7,450, respectively, from the Dayton, Ohio-based company.

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Their Survival at Stake

DP Managers Urged to Use DDP Technology

By Marcia Blumenthal
CW Staff

CHICAGO — DP managers are going to lose the distributed data processing (DDP) battle to line management, so devising a way to introduce DDP technology into the organization that will allow DP managers to come out of the trenchs unscathed is a must, according to Cornelius Peterson, president of Distribution Management Systems, Inc. "Survival" was one of the key words used to describe the situation DP managers face when they resist operational management's desire to introduce DDP into the organization.

Speaking at a session of the Fifth Information Management Exposition & Conference (Info '78) here last week, Peterson said DP managers who can manage their organization's transition to DDP will become pivotal figures within their firms.

Inexorable Trend

It does no good to resist minicomputer-based DDP technology when the technology generates revenue for the corporation, Peterson said bluntly.

The much discussed question of whether to accept or reject DDP is now moot, he maintained. The issue may have been a hot one "a few years ago when I had to explain that Digital Equipment Corp. was not a manufacturer of watches," Peterson joked.

Attempting to offer yet another entry in the race to define DDP definitions, Peterson stressed that DDP must work for operational management. "It must support the day-to-day operation in remote locations instead of remote locations supplying data to update accounting files," he stipulated.

"DP managers examine intelligent terminals and think they have DDP, but all they have is remote data entry," he added.

Three Arguments

Peterson refuted the three major arguments made by DP managers against DDP. The contention that DP managers can't control software maintenance and development is simply not valid, Peterson said.

In fact, the DP manager gains control because minis in the field are performing dedicated work and are operated by non-DPers.

According to Peterson there is no software development going on unnoticed in the field.

Issues Remain

The issues of software maintenance and reliability remain, regardless of what kind of a system a company has, he noted. Speaking to DP managers' concern for technological changes not compatible with minis already installed, Peterson said that mini makers, like mainframers, must protect their installed bases. The attention to the installed base ensures stabilized technology and minimizes the risk of obsolescence, Peterson insisted.

A third fear of DP managers is that a non-DPer, such as a financial vice-president or a distribution manager, will push for a distributed system. "Computer professionals," Peterson emphasized, "must get used to the idea that their mystique is eroding."

The issue of loss of control is a perceptual problem, Peterson suggested. Line managers view mainframes as overpowering and controlling. Those managers do not fear minis because they feel that within a decentralized organization, they have already lost some control, Peterson reasoned.

DP managers, on the other hand, feel the proliferation of minis signals the loss of control. These managers are wary of any system that is not hierarchical.

The DP manager is going to have to yield to the line manager's perception, Peterson contended, because "not only are minis economical, they are oriented to people — ordinary people — and that is why they are valuable.

CW at
Info '78

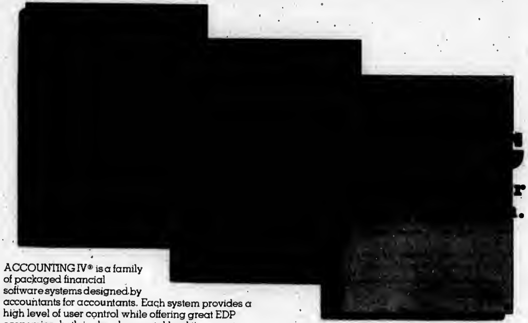
World Data Flow Newsletter Topic

BROOKLINE, Mass. — Information Gatekeepers, Inc. (IGI) has announced publication of a newsletter devoted entirely to questions and issues of transnational data flow.

According to Dr. Paul Polishuk, president of IGI, "TDF Newsletter" will have several objectives:

- Complete coverage of laws affecting transnational data flow.
- Assistance to firms doing international business which need to obtain up-to-date information and accurate interpretation of data protection laws.
- Analysis of decisions affecting the free flow of information between nations and assessing their impact on business.

The monthly newsletter will sell for $75 (U.S.) and $100 (foreign), IGI said from Suite 212, 167 Corey Road, Brookline, Mass. 02146



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A comprehensive foreign currency conversion module is available. Three separate and unique report writers are included; one to produce conventional financial statements; a second to produce consolidating statements and divisional matrix comparisons; the third to provide full graphic display capability. The System is available with "ON-LINE" data entry and inquiry, and interfaces to TOTAL, IDMS, DL/1 and IMS data bases.

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This System is user-controlled and entirely parameter driven to completely automate the accounts payable function. Data entry and validation can be accomplished via an optional "ON-LINE" Module. A new Purchase Order Module allows automatic match-up of purchase orders, receiving and inspection notices, and invoices. The flexible MARK IV/Reporter is available to extend reporting capabilities beyond the 48 standard reports.

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Managers on the Move

Robert C. Jost

ROBERT C. JOST has been promoted to manager of programming services by Drew Chemical Corp. in Boonton, N.J.

Jost, a graduate of Fairleigh Dickinson University, joined Drew in 1971 as a systems analyst.

• • •

RICHARD F. RAY has been named systems director in the customer services area of GTE Data Services, Inc.'s systems development organization.

Ray joined the General Telephone Co. of the Southwest in 1967 and, after a series of regional promotions, became customer services director for General Telephone of California in July 1978.

He holds a bachelor's degree in business administration from Angelo State College, San Antonio, Texas.

• • •

JOHN V. LEDWITH JR. has been appointed vice-president of management information systems for Morton's Shoe Stores, Inc. of Boston.

Ledwith previously held computer systems, programming and management positions with Corning Glass, 3M Co., Bennett Importing Co. and Sanders Associates. He most recently served as vice-president of administration at Hampshire Manufacturing Corp., a Morton's subsidiary.

• • •

GERALD P. MEIER has been named director of data processing for ACF Industries, Inc. of New York City.

Meier, formerly manager of the Systems Division for the Carter Automotive Group, will now be responsible for data processing and programming for all of ACF.

He holds a bachelor's degree in commerce and a master's degree in management sciences from St. Louis University.

• • •

WALTER MULLEN has been appointed director of technical services at IMS Systems Corp. in New York City.

Prior to joining IMS Systems, Mullen was employed for 10 years by New York Life Insurance Co. in a systems management capacity.

• • •

PAUL ZIMMERMAN has been named manager of management information systems at J. Riggings, a division of U.S. Specialty Retailing in Atlanta.

Zimmerman will be responsible for systems, programming and DP operations for the J. Riggings and Outrigger divisions.

Prior to joining J. Riggings, Zimmerman had been associated with Rich's in Atlanta and the National Bank of North America in Long Island, N.Y.

• • •

ARTHUR CHESTER has been appointed director of management information services at Itel Corp.'s Industrial and Business Products Group in Rochester, N.Y.

Chester came to Itek from Rochester Telephone, where he was manager of minicomputer development and was largely responsible for the introduction of the state-of-the-art systems now employed there.

He holds a B.S. degree in economics from Canisius College and is also a graduate of the International Data Processing Institute.

Call for Papers

TRENDS AND APPLICATIONS 1979: ADVANCES IN SYSTEMS TECHNOLOGY, Gaithersburg, Md., May 17, 1979.

The theme of the conference is systems technology which will impact the '80s with specific interest in developments in computer architecture; distributed processing, micros in consumer products, office system technology, networking technology, embedded micros, and security from a system's viewpoint.

Papers which deal with evolving applications for advanced systems technology are also desired.

Three copies of 1,000-word abstracts should be forwarded by Dec. 15 to Patrick V. McGregor, Network Analysis Corp., 410 Pine St., Vienna, Va. 22180.

SOUTHEASTCON 79, Roanoke, Va., April 1-4, 1979.

Authors are invited to submit papers on new developments in the theory, concepts, techniques and applications of electrical and electronics engineering. Papers are solicited in such areas as aerospace electronics and systems, bioengineering, computers, microprocessors, communications, control systems, digital devices, education, electromagnetic fields, electro optics and laser applications, environmental monitoring and modeling, energy technology, instrumentation, management, microelectronics, pattern recognition, power systems, semiconductor devices and transportation systems.

For full papers, abstracts of 50 words and a summary of 200 to 500 words or for short papers, four copies should be submitted as soon as possible to Prof. L.L. Grigsby, Technical Program Chairman, Southeastcon 79, Department of Electrical Engineering, Virginia Polytechnic Institute and State University, Blacksburg, Va. 24061.

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BAI Survey Finds

Average-Size Bank Spends 6% of Budget on DP

By Tim Scannell
CW Staff

PARK RIDGE, Ill. — The average-sized bank — one whose total assets run from $100 million to more than $5 billion — spends $276,483 per month or approximately 6% of its overall operating budget on computer hardware, software and other DP-related items, the Bank Administration Institute (BAI) recently found.

Of that 6%, $114,418 is allocated for equipment and maintenance while $162,065, or 3.33%, is spent on DP supplies and support, the BAI said.

The BAI arrived at those figures after surveying 107 banks which reportedly represent all the nation's 14,000 banking institutions. Twenty-eight of the banks surveyed have assets of $100 million to $250 million, 23 are in the $250 million to $500 million bracket, 18 have assets of $500 million to $1 billion, 29 have $1 billion to $5 billion in assets and 16 have assets of more than $5 billion.

Spending Increase in '78

The BAI statistics showed the average bank is spending 12.24% more on hardware in 1978 than it did for DP equipment in 1977.

Nearly 1.5% of a bank's total operating budget is consumed by mainframe, tape drive, disk drive and printer acquisitions while .1% and .15% are absorbed, respectively, by on- and off-site minicomputers and teller terminal installations. The smallest part of a bank's total DP expenditures — .042% — is spent on microfilm/micofiche equipment and on tab or keypunching units (.035%), the report noted.

Big Bank, Small Percentage

The report found that banks with larger assets spend a smaller percentage of their operating expenses on DP. Banks with assets of $5 billion or more invest approximately 3% of their total operating budget in DP, while banks in the $100 million to $250 million category spend nearly three times as much — 8.6%.

The larger banks expend .036%, .382% and .164% of their budgets on software, systems programming and management, respectively, while smaller institutions shell out .656%, 1.026% and .765%, the report pointed out.

The BAI noted that of the 107 banks surveyed, 77% operate their data centers seven days a week and the other 23% shut down their DP facilities for an average of 37.5 hours per week.

The survey also found that 64.4% of the banks sell their DP services to other banks, 27% sell computer time and approximately 20.4% sell software packages.

Course to Focus On Protection Of DP Assets

WASHINGTON, D.C. — If you as DP manager would like to have your company's security officer on your side instead of on your back, why not suggest that he attend a three-day course on the protection of computer assets here Nov. 6-8?

The course is sponsored by George Washington University. It will be led by Robert Jacobson, a certified protection professional on leave of absence from Chemical Bank of New York, where he serves as assistant vice-president for information systems security.

Jacobson is presently staff director for the New York Contingency Facility, a consortium of 16 New York area firms established to study the feasibility of a shared backup computer center.

Focus of Course

Instructors include James P. Anderson, an independent contractor and computer technology consultant, and Lt. Col. Robert P. Campbell of the U.S. Army, who is responsible for the Armywide Automation Security Program.

The course will focus on understanding DP operations, tools and techniques for protecting computer assets. It will emphasize risk analysis, fraud and embezzlement, investigation of computer crimes and evaluation of the current security environment.

The course costs $465. Additional information is available from Continuing Engineering Education, George Washington University, Washington, D.C. 20052.

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Resource, Econometric Models

Firm Building Software to Predict Energy Use

By Brad Schultz
CW Staff

BOSTON — A nonprofit consulting firm here has developed software that predicts how much electricity an entire state will consume 20 years into the future.

A partnership of eight ex-university professors trained in mathematics, physics and the social sciences, Energy Systems Research Group, Inc. develops models that predict utility consumption — 20 years is a standard forecasting time frame — as well as energy resource shortages and the impact of power plant construction and government energy policy on local economies.

Further, the firm evaluates other organizations' analyses and in the process has testified in malpractice litigation between public agencies and other private consulting groups.

Energy Systems personnel have formed opinions about a number of well-known computer systems, since a customer contract frequently requires implementation on the customer DP facility.

For example, a model predicting New York State's electric consumption, which takes into account economic changes, resource shortages and population shifts over the next two decades, was implemented on a Honeywell, Inc. 6000 series mainframe called "decidedly inferior" by Energy Systems' only full-time programmer, William Kreuter.

"Given any choice in the matter, we would not have used the Honeywell system," Kreuter remarked, explaining he discovered bugs in Honeywell's Fortran-supplied subprograms — for instance, the CALLSS function — and found the vendor's Time-Sharing System (TSS) to be inflexible in handling mass storage.

The TSS text editor was perhaps too powerful in the sense that errors in the act of editing too easily destroyed the file at hand, he said, adding he was forced to reload programs from backup magnetic tapes "probably two dozen times" as a result. The system documentation, however, was found to be essentially superb.

Energy Systems developed this model under a contract with the New York State Department of Environmental Conservation that required implementation on the facility normally used by the department, the Honeywell 6000.

Energy Systems has also produced software to generate maps showing heat demand levels within New York City. This project involved simulation of both heating buildings and driving air conditioning equipment with waste steam heat from Consolidated Edison power plants, according to Dr. John K. Stutz, principal research scientist.

The firm has also studied the effects on local unemployment of establishing a nuclear power plant in Long Island, N.Y., he added.

Building Package

To produce a utility load forecasting package, the firm must accumulate a wide range of information, including the amount of power drawn by a typical refrigerator, the number of households in the subject territory, their rate of growth and economic time-series data such as "production and earning indexes."

The Energy Systems researchers work out a set of equations for using this data, Stutz noted, and these equations are turned over to Kreuter, who writes them into Fortran IV routines.

Aside from writing the basic computation routines, Kreuter must produce systems-level software that allows customer personnel without DP training to receive various types of data in response to terminal-fed natural language queries.

Sensed a Need

Energy Systems began in 1976 as a collaboration of State University of New York at Albany (Suny/Albany) colleagues who sensed a growing emphasis on planning by public administrators.

According to Stutz, this trend resulted from the economic misfortunes of the 1970s — cost-push inflation, recession and energy shortages — and has sparked the proliferation of economic forecasting specialty houses like Energy Systems that are utterly dependent on DP technology.

The firm has fond memories of the Suny/Albany computing workhorse: a Univac 1110 mainframe with Exec 8 operating system. As Suny/Albany faculty members, the researchers were able to use this facility until formally leaving the university in 1977, Stutz said.

They switched to Rensselaer Polytechnic Institute's IBM 360/168 with the Michigan Terminal System (MTS) and began converting programs from Univac Real-Time Basic (RTB) to MTS Basic.

But the latter was soon rejected in favor of MTS Fortran IV. The available Basic was just a slight improvement on the Dartmouth version used to teach programming, while MTS Fortran IV appeared more powerful for scientific applications, Kreuter explained.

Kreuter termed MTS "a pretty good controlling language," but called the Univac Exec 8 "much more versatile."

The defects of MTS Basic became apparent during the firm's development of a utility load forecasting program for the Philadelphia Electric Co.

Fortran IV was used for the next utility forecast — for the Pennsylvania Power Co. — and all others since, and Stutz indicated Energy Systems will probably stay with this language through the near future.'

Energy Systems moved to Boston this summer and is satisfied with the facility that presently handles most of its DP jobs: MIT's IBM 360/168 with the Conversational Matching System.

In programming terms, econometric models are notorious for the extent of their variable dictionaries. Stutz described Energy Systems' challenge in developing forecasting software as expediting the required numbercrunching while tailoring the system to an end-user environment.

Accordingly, the research group has stretched Fortran IV to uncharacteristic forms, enabling the host system to field a tall hierarchy of questions, Stutz said, noting the total number of user modes in the Environmental Conservation package "is on the order of several dozen."

The only peripheral locally used by Energy Systems is a Texas Instruments, Inc. Silent 700 terminal.

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'Fed' Completes National EFT Net of 35 ACHs

WASHINGTON, D.C. — The Federal Reserve Board has announced completion of a nationwide electronic funds transfer (EFT) network linking 35 automated clearinghouses (ACH) via the computerized Federal Reserve Wire (Fedwire).

The network now serves about 9,400 banks, 1,500 thrift institutions and 6,000 customer corporations that belong to affiliated ACH associations, a spokesman for the "Fed" said.

These member organizations can present payment instructions on magnetic tape to the nearest Federal Reserve facility for transmission nationwide, he explained. The network joins 34 Federal Reserve DP sites and one privately operated installation.

At present, most of the payments transmitted over the network are of a repetitive nature, including payroll deposits, mortgage payments and U.S. Treasury deposits for Social Security beneficiaries. A magnetic tape bearing instructions for payroll deposits, for example, might contain instructions to make salary payments to a company's employees located in many parts of the country, the spokesman explained.

The Federal Reserve Bank or branch office that receives such a tape passes the instructions to other ACHs via the network.

A pilot program for a national EFT network was approved by the Federal Reserve in 1975 and started the following year. The network's last links were formed in September.

Western ACH sites are located in Denver; Los Angeles; Portland, Ore; Salt Lake City; San Francisco; and Seattle. Eastern ACHs are in Boston, Philadelphia and Pittsburgh.

Southern installations exist in Atlanta; Baltimore; Birmingham, Ala.; Charlotte, N.C.; Columbia, S.C.; Jacksonville, Fla; Louisville, Ky.; Memphis and Nashville, Tenn.; Miami; New Orleans; and Richmond, Va.

The other Federal Reserve ACHs are in Chicago; Cincinnati, Cleveland and Columbus, Ohio; Dallas; Des Moines, Iowa; Detroit; Indianapolis; Kansas City; Milwaukee; Minneapolis; and St. Louis.

The privately operated facility is the New York ACH Association in New York City.

Corbato Gets MIT Chair

CAMBRIDGE, Mass. — Fernando J. Corbato has been awarded the Cecil H. Green Professorship of Computer Science and Engineering at MIT.

Best known for his roles in developing MIT's Compatible Time-Sharing System and Multics, the security-oriented operating system marketed by Honeywell, Inc., Corbato is expected to continue his research in very large-scale integrated circuit design.

The two-year appointment is one of six chairs established at MIT in 1970 to give individual faculty members in computer science and electrical engineering an opportunity to enter new areas of research.

Academy Fellow

Corbato joined the MIT Computation Center at its inception in 1956, after he received a Ph.D. in physics from the university. He has served in various administrative capacities at the center and other MIT computing facilities and has authored numerous research publications.

Corbato is a Fellow of the National Academy of Engineering, the American Academy of Arts and Sciences and the Institute of Electrical and Electronics Engineers. He was an Association for Computing Machinery national lecturer in 1964.

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Meanwhile, back at the home office is the 763, a tabletop model.

It comes standard with either a TTY-current loop or EIA interface, permitting transmission at rates up to 9600 baud. It prints quickly and quietly, edits cleanly, and has a powerful command mode with a full set of key functions. In short, the 763 has everything the 765 has, less the portable features. Both models save time and money, and let your customers know you mean business.

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Two at Drexel Get Grant

Data Base on Energy Recovery to Be Compiled

By Marcy Rosenberg
CW Staff

PHILADELPHIA — The U.S. Department of Energy has awarded a $1 million research grant to two professors at Drexel University here to develop a national data base that would generate comprehensive information on how to recover energy from more than 100 different manufacturing processes.

Dr. Harry L. Brown, nuclear engineer and director of Drexel's Energy Institute, and Dr. Bernard B. Hamel, a fluid dynamics specialist, are heading the project, which has also received $300,000 funding from the National Science Foundation.

The ultimate research goal, Brown said, "is to put together, for the first time, an industrial model outlining where and how energy is used in industry and ways to recover and recycle waste heat into plants."

The data base will break down how an industrial sector uses energy not only by manufacturing process— as in petroleum, food, chemical, metals or paper operations — but also by kind of waste stream, flow rate, temperature, time-of-day use and by whether the waste can be stored, Brown explained.

In addition, the data bank will contain more than a dozen different energy recovery methods, he noted, ranging from on-site power generation to heat pumps. From 300,00 to as many as one million pieces of information will be stored in the data base to match energy recovery methods with specific production needs.

Fortran and Basic

"We are using Fortran IV and some Basic machine language for the program," Brown said. "The large amounts of data and the inquiry and access modes may require some Basic."

A user would dial into the main computer, an IBM 370/-168, and access whatever information he needs from the data base through a satellite terminal in his area. The IBM computer is located at Unicoll, the computer complex at University City Science Center here, which is operated by Drexel, the University of Pennsylvania and others.

Slated for completion by this summer, the data base will be available to industrial users for a few hundred dollars.

FBI Head Set As Keynoter

PARK RIDGE, Ill. — The director of the Federal Bureau of Investigation, William Webster, will be the keynote speaker at Bank Administration Institute's (BAI) 10th National Conference on Bank Security.

The annual conference will be held April 1-4 at the Shoreham/Americana Hotel in Washington, D.C.

Webster is expected to discuss the FBI's role in bank crime in light of the recent effort by the General Accounting Office to reduce the FBI budget for bank investigation.

Further information on the conference is available from the BAI at P.O. Box 500, 303 S. Northwest Highway, Park Ridge, Ill 60068.

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United Airlines Picks CAI To Teach Pilots to Fly Right

DENVER — United Airlines is using computer-aided instruction (CAI) to manage a large-scale pilot training program that will extend over the next five years. Because of retirements and increased flight schedules, United plans to train up to 1,800 new pilots between now and 1983.

"It's the first new-hire program in nine years," according to Grant Beutler, manager of training program development at United's Flight Training Center here.

"When we started planning a criterion-referenced, individualized format for this program, it was obvious we would need more than new training materials and more classroom space," Beutler said. "We also needed a quick, accurate way to test candidates, keep track of individual progress and make sure the instruction complemented each pilot's background in order to expedite the training schedule."

After an extensive study of educational technology and techniques available for handling a program of such size and critical training tasks, United installed Control Data Corp.'s Plato system with eight terminals. The CAI system handles testing and scoring, prescribes study activities, displays pilot progress and provides data for evaluating the effectiveness of the instructional materials.

The terminals, linked to a CDC Cyber 73 mainframe located in Arden Hills, Minn., display questions and problems about airplane operations. Pilots use the terminal keyboard or touch the screen to answer questions that are presented in the form of text, drawings and animated graphics.

'Study Prescription'

The results of the pilots' first test determine what their training should include. This "study prescription" may be in the form of manuals and other written materials, films, videotapes and audio tapes that are available in United's learning resource center.

Pilots return to the Plato terminals whenever they feel prepared for another test. If they pass, they have demonstrated satisfactory knowledge of the subject; if not, they are guided to additional study materials and then repeat all or part of the test.

"With this method we don't spend time and money teaching pilots what they already know," Beutler explained. "Nor do we force them through elementary materials just to get to the information they really need. There's no other training technique available that enables us to approach the individual's learning needs in such a precise way."

United's training specialists prepared nearly 3,000 questions that relate to 26 different aeronautical topics. These questions, along with simple instructions, were entered into the central computer through the Plato terminals. The Plato system software formatted this information to provide the appropriate displays to the individual pilots.

Recordkeeping Capabilities

Charles Buchanan, senior training specialist at United Airlines, noted that without the recordkeeping capabilities provided by the Plato system, the training program would be extremely difficult to manage, as well as being costly and ineffective.

"We couldn't begin to manually document all the pilots' backgrounds and select the appropriate learning materials," he said. "And it would be logistically impossible to keep progress records when pilots are at different levels at different times."

Data generated by the pilots as they work through the various tests gives United's training officials an opportunity to analyze the quality of the tests and instructional materials. For example, if a wrong answer is consistently given to a particular question, instructors know the question may be faulty.

Offers Flexibility

Through the Plato terminal, they can easily delete or change it. This same flexibility applies when it comes to changing an entire test or including reference to new learning resources.

But most important, Beutler noted, the system responds to individual learning needs in a very personal way. This involves a precise method for selecting not only subject matter, but the media through which it is delivered.

"Some people respond best to textbook readings, others to visual media such as films, slides or videotapes and still others to workbook exercises," Beutler observed.

Accurate Measurements

Considering the critical tasks associated with operating today's complex airlines, proof of proficiency is extremely important in a pilot training program. For this reason, reliable testing methods are necessary to accurately measure the pilots' progress.

If the testing procedure is not adequate, training time is extended and careers, as well as overall airlines operations, can be affected, Beutler said.

United's training officials believe the testing and reporting capabilities of the Plato system bring a new accuracy to the process of measuring individual progress against learning objectives. The tests are "mastery-oriented" and "criterion-referenced," as educators say, which means they are designed to show the extent of a pilot's understanding and whether he needs additional study in a particular area.

In addition to installing the Plato system, United has built a new learning resource center with 99 instructional units packaged in different multimedia delivery systems.

Ten Man-Year Effort

Under the direction of Ralph Beardslee, senior training specialist, the learning resources were produced within a six-month period, but represent up to 10 man-years of effort. Correlation between the study materials and the content of the tests was maintained throughout the project to ensure effective training packages.

Expanded use of the Plato system in United's training program will include the computer-assisted component of the system. In this application, interactive instructional materials — as well as tests — are provided by the system to offer a comprehensive, educational environment that serves course author, instructor, student and administrator.

With the CAI system, United plans to make extensive use of simulations to reproduce on the terminal screen the operation of cockpit systems and in-flight situations. This is expected to reduce the time pilots spend in expensive cockpit simulators.

It also will allow them to work with problems and situations that are too expensive, risky and even impossible to stage in an airplane.

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Editorial

An IBM World?

With the proliferation of firms making or selling central processing units plug-compatible with IBM mainframes, the computer industry is rapidly becoming an IBM — or at least an IBM compatible — world.

Nine U.S. firms are now making or marketing IBM software-compatible computers — and in Japan several of the major computer makers are looking seriously at offering IBM-compatible units to their home market. This has vast implications both for computer manufacturers and to computer users.

The key to these machines is their compatibility with IBM 360 and 370 software and the rapid reduction in hardware prices over the past few years. It is extremely easy and relatively inexpensive today for an engineering group to develop and build a compatible processor.

At the same time, all of the IBM 360 and 370 operating systems are in the public domain and can be run for free on the compatible processors, saving the developers of those systems from the much more difficult task of developing operating systems.

Almost 70% of the computer users in this country use IBM equipment and software. It has been estimated that these users have invested almost $200 billion in applications software.

Users previously faced horrendous conversion costs and delays if they wanted to switch from an IBM computer to that of another manufacturer. Now, however, they can choose from a wide choice of processors — all of which operate with their present software.

In addition to their own internally developed software, users of IBM computers have the widest choice of independent software of any computer users; the software houses concentrate on IBM-compatible software because it represents the largest potential market for their products.

For the industry, this trend has serious implications. Until now the plug-compatible manufacturers have concentrated their marketing efforts on the large base of IBM users. In order to keep up their growth and shipment rates, they will soon be marketing to users of other computer equipment.

These manufacturers will certainly stress the advantages of having an IBM-compatible machine, and they may be successful in luring converts from the ranks of Honeywell, Univac, NCR and Control Data Corp. customers.

Each of those firms will be seeing a lot more competition in the future than they do today. And they may see some erosion of what has essentially been pretty static market shares, leaving them with the choice of getting on the IBM-compatible bandwagon or intensifying their efforts to lure the first-time user into their fold.

With all of the alternatives available; users are going to have a much harder time in evaluating their equipment purchases than they had in the past. First they will have to decide whether to go into the IBM-compatible world, then they will have to choose from all the alternatives in that world.

The entry of the plug-compatible mainframe into the DP market is certainly going to make the industry more exciting over the next few years, but it may cause a few casualties in the ranks of the more traditional mainframe firms.

Data Past

Five Years Ago
Oct. 24, 1973

TULSA, Okla. — "Easy come . . . easy go!" shouted the jaunty, almost cocky Tom Barr outside the courtroom after Judge A. Sherman Christensen set aside his $352.5 million judgment for Telex Corp. The sticking point was the IBM counterclaim charging that Telex stole IBM trade secrets for which the judge had fined Telex $21.9 million and the concept that much of Telex's success was the result of those thefts.

— — —

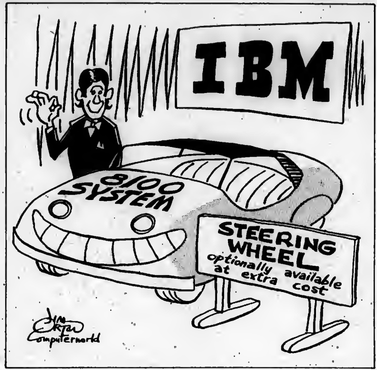
NEW YORK — Potter Instrument Co. decided to discontinue any further action in the antitrust damage suit it was considering filing against IBM. According to John T. Potter, chairman and chief executive officer, Potter cancelled the previous suit in return for a product development contract.

Eight Years Ago
Oct. 28, 1970

NEW YORK — Trans World Airlines, one of the largest users of Burroughs Corp. computers, filed a $70 million suit against the manufacturer, charging that "misrepresentation and breach of contract" made a shambles of the airline's passenger reservation system. Burroughs countered by filing a suit for $11.5 million to recover the balance due in the $38 million contract, which was first announced almost four years ago.

— — —

GAITHERSBURG, Md. — Dr. Ruth M. Davis was appointed director of the Center for Computer Sciences and Technology at the National Bureau of Standards here, replacing Dr. H.R.J. Grosch, who was appointed Special Research Fellow last spring.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Letters to the Editor

Erroneous Calculation

In reference to the "In Depth" article of Oct. 9, Irwin Kraus's method is interesting, but the article contained errors in the calculation of the chance of finding a figure containing a given digit difference.

He said, "Since any of the 18 differences from a transposition error have an equal probability of occurring. . ." Kraus had, at this point, already pointed out himself that there are nine ways of obtaining a difference of +1 but only one way to have a difference of +9. Obviously, the chances are nine times as good to have a difference of +1 as a difference of +9.

He continued by saying that the average probability that a figure will contain the transposition difference is 5 (the average number of ways a difference can be obtained) /90. Actually, the probability is 5/100 = .05.

There are 100 possible two-digit combinations. The 10 combinations that cannot yield a transposition error (i.e., x = y) have been erroneously excluded.

A further point not considered in the article is that as soon as we know in what column the error occurred, we may already have cut down the number of transactions that must be scanned. For example, if the error was in column 4 and 5, then all figures with less than five digits are excluded from consideration.

F. B. Wadelton III
Summit, N.J.

Contradiction by CW

Computer*world*'s association with the new Iranian magazine *Mideost Computer* [CW, Sept. 18] strikes a discordant note in CW's superb and seemingly courageous call for democratically responsible DP.

Only last December, when the Association for Computing Machinery severed its ties with Soviet computer scientists, CW made the excellent recommendation that it also dissociate itself from other repressive regimes such as those of South Africa and Chile [CW, Dec. 19].

The Iranian tyranny most recently reminded the world of its brutally repressive character by machine gunning to death hundreds — some reports say thousands — of demonstrators in the streets of Tehran.

How can CW, without violating its own editorial policy, give editorial support to a magazine that aims to encourage computer applications by a government like this? The December editorial may have answered this question when it noted that "the U.S. computer industry will not pass up making a buck for moral considerations."

Or perhaps *Mideost Computer* will be a democratic voice crying in the wilderness. It could, for example, denounce the fact that an agency as unrestrained by legal processes as the Iranian police force is now making extensive use of computers [CW, June 20, 1977 and July 18, 1977]. However, the climate in Iran for this kind of journalism is, to put it mildly, discouraging.

If the editors of *Mideost Computer* criticize any of the Iranian dictatorship's information policies, more power to them, but they can expect a visit from Savak agents. And they might not knock.

Michael F. McCullough
Washington, D.C.

Plenty for Everyone

I would like to add one thought pertaining to the proposed nine-digit Zip Code [CW, Oct. 2]:

There will be enough Zip Codes for each person to have three Zip Codes of his own.

The problem would then be to make sure the Post Office followed us around without losing mail.

John W. Hotz
Chicago, Ill.

The Human Connection

DP Center Often Reflects Leader's Attitude

By Jack Stone
Special to CW

Last week Bob Currie told how his organization of Action program evaluators responded to the challenge of acquiring computer services support on the outside after being unable to get it from their in-house DP organization. (Action is the U.S. federal government agency that organizes volunteers for social service programs.)

I suspect it was the resourcefulness developed from his many years as a Peace Corps volunteer in the Far East that drove Bob to take the initiative for his own computer services program, but whatever it really was, the program flourishes today. (Come to think of it, Peace Corps volunteerism may be an apt cure for a large number of lethargic users I know.)

Bob had more to say about DP activities in his agency.

Under the previous management of the DP department, the all-consuming concern of its people was the maintenance of its major systems. Their typical response to our requests for aid was "We'd like to help you but we're so busy trying to meet our current production commitments that we just can't get to you."

Well, as you could expect, not only were the individual user groups suffering from the lack of support, but top managers in the agency effectively chose to ignore the efforts of the DP activity, many continuing to perform their paperwork functions in manual mode. As a good example of this situation, let me describe the situation in the budget division.

The budget people perform the classic function of taking the annual budget given to us (by Congress) and divvying it up among the various operating departments of the agency. They work hard and long doing their job, which is very tedious.

One of their responsibilities is the rebudgeting function, which is performed when new program requirements or laws or regulations dictate reallocation of funds. Well, the people up there have to examine a number of different distribution strategies on a manual basis before selecting a final choice. It is a horrendous task.

On-Line Budgeting System

A while back, the DPers addressed this problem and constructed an on-line budgeting system. The system, built around a minicomputer installed right in the building, could greatly assist the budget office in producing timely budget plans for operating programs.

However, as the budget people continue to do their reprogramming on a manual basis, they do not have time to effectively use the full capability of the automated system. Instead they use the mini primarily as a terminal to transmit summary data to the accounting application system, which is supported by the outside service bureau.

As the budget input to the accounting system is key for several accounting functions, i should note that delayed budget information causes problems throughout the system.

The lack of harmony between the budget and accounting systems has had secondary effects on the organization. Because of the heavy manual effort required for budget updates, revised budget plans are only issued at quarterly intervals, and when the new budgets reach the line managers, they are late or out-of-date and really not very useful.

Furthermore, during replanning cycles, the budgetary information is distributed through many source documents in the budget office and is not easily accessible to line managers. The image of that office, which is not warranted but is unfortunately projected, is, therefore, one of tight control over information that is vital to the line managers, lack of responsiveness to questions about budgets and poor performance as a result of tardy reports.

But I'm pleased to report that "all's well that ends well." We now have a new director of DP who has brought with him a fresh and welcome approach to us users. His style is, "How can I help you?" And believe me; it's infectious.

The DP branch heads; who seemed to be inaccessible before, have now blossomed forth. They are continually looking at how they can improve current applications to do a better job, rather than cranking up the same systems year after year with little contact with the users --- not an altogether unknown phenomenon in the industry.

Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C. 20007.

. . . And in This Corner

Banks Using DP to Avoid Facing Up to Customers

By Kenniston W. Lord Jr.
Special to CW

This year has been the "Year of the Bank" for me. My dealings with banks would have sent Mr. Average Consumer into a tailspin. For me it has been a year of frustration; expense and — unfortunately — anger.

It all began during the final week of January, when the Union Bank of Lowell (Mass.), through unauthorized deductions and keypunch errors, tagged my checking account for something more than $1,100. Three weeks later, at considerable loss of time and expense, the situation was straightened out, after a fashion, without so much as "I'm sorry."

Had only one account of a well-heeled customer been involved, it might not have counted for much; but the bank's action had secondary and tertiary effects. Worthless paper got returned from all over the country, and yours truly was marooned in Blizzard Larry, running up horrendous telephone bills trying to get the whole mess straightened out. The upshot of that was a large expenditure by me — which we will no doubt one day have to settle in court. That account is now closed.

Next came the Baybank/Newton-Waltham. That bank didn't make any glaring errors, except that it wasn't very good at communication, until forced to be. It was far easier to let the computer do the badgering.

A threat of a lawsuit got bank officials to talking and the matter was settled. It worked out that they were right, but a little concern for the customer would have gone a long way and saved a whole lot of time and money.

My current nemesis is the Northern Connecticut National Bank, which seems to feel that it's OK to misinform the customer; to cause him undue frustration; to tell him that it does not do things when it does; and to remove funds from an account without advising the customer, causing an overdraw, and then sock him with an overdraw charge for the privilege.

Two weeks after I received my "very important customer" letter, I protested the handling of my accounts to the bank's president, who responded that if I didn't like the way the bank did business, I should go elsewhere. In return, he was told "no dice" — the bank was going to perform, or I'd know why.

The crowning touch of the whole fracas was The Bank of Nashua, N.H. My balance there was 82 cents. So, when I decided to close that account, I wrote a check for that amount and deposited it to one of my other ac-

(Continued on Page 28)

The Taylor Report

'Correction' No Answer To Data Base Security

By Alan Taylor
Special to CW

A major problem in many data base systems is how to keep the data base safe from unauthorized access and modification. Traditionally either a terminal or personal password has been used to control access.

However, because of unauthorized use of authorized terminals and the changing needs of access, the password system has proven inadequate. Once authorized to use the data base, people often retain their ability to access and modify data without being "reevaluated".

An alternative to the password system, "An Authorization Mechanism for a Relational Data Base System," by Patricia P. Griffiths and Bradford W. Wade of IBM's San Jose Research Division appeared in *ACM Transactions on Data Base Systems* in September 1976. Subsequently, I commented on the suggested authorization mechanism in this column. (CW, Dec 6, 1976).

'Correction' Published

Now, a so-called "correction" has been published in *ACM Transactions on Data Base Systems* (September 1978). This correction comes from Ronald Fagin, another IBM Research Division laboratory worker, and it is supposed to be regarded as no more than a mathematical correction of the original mechanism.

However, i disagree with the basic philosophy behind it since it favors the right of access over a clear danger signal to a protected data base. Let's review the Griffiths and Wade proposal and then look at why Fagin's correction is dangerous.

Although originally intended for relational data bases, many of Griffiths' and Wade's solutions, as they pointed out, were applicable to *any* multiuser data base system that dynamically grants, checks and revokes authorization.

in their system, data base developers permitted users to grant access, to delete privileges and so forth and also allowed them to pass on such privileges to others. However, such grants could be revoked at any time.

But consider what happens when a person's authority is revoked and an independent user — who is also properly authorized to grant access and delete privileges — has already made a separate grant of access to that person. A conflict certainly results.

Originally, the Griffiths and Wade mechanism interpreted a "revoke" order as a cancellation of *all* existing rights to the file.

(Continued on Page 28)

Banks Communicate Poorly With Customers

(Continued from Page 27)

counts.

The Bank processed 80 cents of the 82 cents, leaving a balance of two cents. Several letters from me and several computer-run statements later, I finally put my foot down and told the bank that if it wanted to continue to pay the administration costs for two cents, which was its money, it could be my guest.

In response, I received a certified check for two cents. Unable to resist, I notified the Bank that its books would still not balance, as there was no way I would cash that check. It is now suitably framed, in honor of the "Year of the Bank."

If we were talking about some isolated instances, this might seem like the vendetta of just one individual. However, we're talking about the repeated actions of financial institutions to frustrate the consumer with, by and through the computer, coupled with an extreme lack of valid communication and a gross insensitivity to the needs of people.

Perhaps the worst part is the downright arrogance of these institutions. They feel it's perfectly all right to manipulate customers and, further, feel they can do so with impunity. I would hazard a guess that I've not been the only one so treated.

My concept of a bank is that it should function much as a public utility. Recognizing that it is a profit-making institution, it should make every effort it can to attract my money, satisfy all my reasonable needs and do so with grace. It's inconceivable to me that I should be thankful it has condescended to do business with me.

Attempts to deal with banks as with people prove hopelessly fruitless. They understand only numbers, and so long as people are only numbers, why should they care?

There should be a law to force these institutions to deal with people directly — and particularly in cases where the bank itself has made the error.

The law should require that when the bank does make the error, it should be forced to satisfy all debt incurred by the customer when it becomes necessary for the customer to take action to straighten the bank's mess out.

Most important to me, there should be a law requiring the bank to notify its customers any time money is removed from an account, when the customer might not otherwise recognize it. Such instances include check charges, when they are made, and service charges, when they are made — not when the statement is produced. In some instances, they are radically different dates.

Too often the bank assumes the customer is guilty until the customer himself proves he is innocent. How many customers understand the process?

I'm sure I'm not alone in this regard. Let's hear of some of your bank-related experiences and what you did about them. Sooner or later, we'll find the key to make the bankers sit up and listen.

Correction Not Good Solution

(Continued from Page 27)

Now, the "Correction" permits the person whose authority from "User A" has been revoked, to continue to access the same file, because of a previous authority granted by "User B".

Imagine a bank employee gets access to a data base for two reasons: because of his active involvement in some project and by virtue of his position in the DP department. But a question about trustworthiness arises, and the DP department revokes his right to access.

The people who granted him access because of his project, however, continue to do so. In fact, they have not even been told about the revocation or the reasons for it.

That is the situation; the question is, does the "for access" or the "against access" authority prevail?

This should be decided by reviewing the function of the data base rather than the "rights" of the person claiming access. The authorization process should keep the data base secure.

Therefore, it is entirely correct to cancel all access rights when a revocation occurs. To do otherwise, *when there is only one revocotion method available*, means risking the loss of security to avoid, at the most, an occasional inconvenience.

But two alternative revocation orders can be provided — one which explicitly says not to revoke any other authorization, even if it is for the same files, and one which leaves the revocation of access to a file complete, when access rights are restored in full understanding of the changed circumstances.

In any case, I can't accept Fagin's concept that the right of the one who accesses should come before the users' right to have controlled, secure access. I don't think his correction is a correction at all.

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DEC, Data General, H-P communications costs are down

If you're supporting remote terminals on your DEC, Data General, or H-P system, with more than one terminal per location, chances are you are paying a fortune in communications costs and probably not even running the terminals as fast as you'd really like to. And to add insult to injury, you have to put up with the occasional phone line 'glitch' which drives your CRT's crazy.

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Three Levels of Support

Honeywell Users Offered CPE Service

By Don Leavitt
CW Staff

PHOENIX – Honeywell, Inc. is now offering a three-tier computer performance evaluation (CPE) service to provide users of the company's Series 6000 and Level 66 large-scale systems with studies ranging from an overall system evaluation to a pinpoint analysis of one problem area.

All three levels of support in the Systems Optimization and Monitoring Services (Soms) focus on systems running under the Gcos operating system and all three may include use of hardware and software monitors on the user's equipment, according to a spokesman.

The reports generated by the various Soms options are said to provide detailed information in formats that are useful to both general management and DP professionals. The reports aid the user in determining the system load and tuning it for optimum performance while monitoring resource utilization and documenting such things as approaching saturation, the spokesman said.

The most fundamental of the Soms options, the Comprehensive System Performance Study (CSPS), was designed to provide users with thorough evaluations of their systems' overall performance.

Starting with information provided on a questionnaire form, each study is tailored to focus on those areas of special interest to user management.

Once the aims of the study are defined, a team of Honeywell technicians install hardware and software monitors on the user's equipment. Data is generally collected for 10 to 14 days, and the raw data tapes are sent to Honeywell's Soms center here for data reduction and analysis.

Except when the monitors are first installed, the study neither disrupts the user's operation nor preempts machine time, the spokesman said. Only minimal resources are required by the operation of the software monitor, he noted.

Within three weeks after data has been collected, a comprehensive final report is prepared by the Phoenix center and delivered to the user in a "live" presentation. At that time, Soms team members are available to answer questions or elaborate on the reports.

The CSPS report includes an analysis of current utilization,

(Continued on Page 31)

IBM Interactive Language Facility Eases System Use Under VM/CMS

WHITE PLAINS, N.Y. – An interactive language facility has been introduced by IBM to simplify the use of large-scale systems running under the Virtual Machine facility with the Conversational Monitor System (VM/CMS).

Query-by-Example (QBE) provides a nonprocedural approach to information analysis, allowing the end user – who may be a complete novice in DP – to pose queries in familiar terminology and logic. Rather than make the user work with the peculiarities of a language, it enables him to visualize the data base as a series of two-dimensional tables with rows and columns.

Full data manipulation is possible with QBE, according to a spokesman, who cited retrieval, insertion, modification and deletion of table definitions, user-stored data and stored queries as among the facilities of the Installed User Program (IUP).

Queries are made from an IBM 3270 CRT terminal using two-dimensional table skeletons, by filling in the appropriate table spaces with an example of a possible solution, the spokesman said.

The user can query the data base by using a combination of examples of the data required or by keying in actual data values – which may give the exact match wanted or the limit of a range of values, any of which are to be reported in the specified column, he explained.

In addition to its interactive query capabilities, the software provides batch extraction facilities that allow information stored

(Continued on Page 31)

UCC Profitability Analyzer Updated

DALLAS – University Computing Co. (UCC) has announced Version 2.0 of its Customer Profitability Analysis System (UCC/PAS), which is said to provide the ability to calculate and evaluate rate of return based on a customer's relationships to a financial institution.

Since UCC/PAS enables the institution to measure the bottom line profitability of individual customers, it should help bank officials determine profitable component pricing of new and existing services and measure the performance of officers responsible for soliciting or accepting customers for various services, a spokeswoman said.

Intended for IBM 360- and 370-oriented institutions, version 2.0 not only provides increased user control and flexibility, but also gives additional batch reporting and on-line capabilities, she claimed.

New reports in the update include one that selects business customers by SIC code to determine overall profitability of industry groups. Customer profitability reporting may be selected for a range of customers or by individual, she continued.

The on-line enhancements include the ability to request computation of a customer's rate of return by name, based – apparently – on data provided at the time of inquiry, permitting analysis of customers even before they are established on the system master file.

Account analysis parameters and rate fields have been expanded, the spokesman continued. "Nonautomated" account fields include funds used and supplied; they can be used for on-line entry to records not on the master file, according to the spokeswoman.

The account analysis facilities have been expanded, allowing user-defined and coded analysis procedures. Intermediate results may be printed on detail reports at the user's option, UCC said.

In addition to the system's expanded capabilities, UCC/PAS's operational efficiency has been improved. Runtimes and memory requirements have been reduced, the spokeswoman said.

Written in ANS Cobol and IBM's ALC assembler, the package can be used in various operating environments. Version 2.0 costs $25,000, the company said from 8303 Elmbrook, P.O. Box 47911, Dallas, Texas 75247.

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DDP Definition? A Business — Not DP — Issue

By Robert Chamberlain
Special to CW

Having led several recent attempts to define "distributed data processing" (DDP) and having reviewed many well-intentioned definitions in the trade press, I am led to the observation that the wrong tack is being taken in this matter.

Too much effort is being exerted in what is becoming an increasingly aggressive attempt to "find" a definition -- as if it were tucked behind a blackboard or awaiting the probing scrutiny of a yet-unwritten doctoral dissertation.

What is being overlooked is that DDP is a business information question first and a data processing one second. In other words, there are no "distributed data processing systems" as a given; there are business information systems which may be distributed by virtue of their having significant processing characteristics or potential.

Chief Characteristics

The chief characteristic is that end-user products (reports, for example) can potentially be produced at more than one point. These points are usually geographically distinct, although they can reflect functional or departmental distinctions at the same location.

Final output may not, after analysis, be produced by DP technology at each of these sites. This is a decision to be made by senior staff from both the appropriate user areas (geographical or functional) and the DP department.

A decision not to "process" at a particular site may mean the system is not totally distributed from a DP point of view, but the key fact is that the *need* for a decision arose from business information considerations and not DP ones.

It may very well have been resolved by non-DP considerations, also. They can even include the personal and political clout of those individual players or groups who have the strength to maintain a status quo. These factors have overridden or shaped such DP input as cost/benefit analysis or computing power availability.

A second characteristic of a distributed processing system is that data is transferred from a point that can produce an end-user product to another point that can produce an end-user product.

This is generally but not necessarily from the "field" to "headquarters"; it can also be from "field" to "field," making the system software control problem different. Not, however, changing or enhancing the question of DDP.

Actually, attempts to define DDP in terms of software, both telecommunications and otherwise, have probably provided the major false starts in the definition derby.

They overlook what has happened. historically, that DDP is not the brainstorm of DP but was quickly shelved by DP when mainframe worship was at its height. The fact that previous DDP may have been non-DP does not detract from this observation.

Had the mini mainframes come first, DDP would be the order of the day and, no doubt, the untapped potential of centralized systems would

(Continued on Page 32)

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Course for Non-DPer

NEW YORK — "It's no disgrace to be confused by data processing. Most people are," according to a brochure outlining a three-day course, Fundamentals of DP for the Non-Data Processing Executive, being offered by the American Management Associations (AMA).

Course leaders will be drawn from the AMA, industry and academia. Fundamentals will be presented in November twice in New York and in San Francisco, Cincinnati and St. Petersburg, Fla; in December in Boston, Albuquerque, N.M., and Chicago; and in January in New York, Denver, San Francisco and New Orleans.

More information about the $545 course ($475 for AMA members) is available from the Associations, 135 W. 50th St., New York, N.Y. 10020.

Honeywell Adds CPE Support

(Continued from Page 29)

recommendations for improvements within existing resources and, finally, recommendations for system upgrades if they seem appropriate. The basic cost of CSPS is $12,000 plus expenses for the Soms team.

Building on CSPS-type work, the Periodic Management Reports (PMR) service is intended for the user who requires CPE on an ongoing basis. Data is collected on a weekly basis, again with both hardware and software monitors, and users get a weekly report of system performance.

Monthly and year-to-date reports summarize the weekly data and present trend analyses; they also give figures on average utilization by resource, peak resource utilization and identification of areas requiring more detailed study.

Reports are geared to general management, with data and conclusions presented in graphic form whenever possible. In addition, the year-to-date report includes a summary highlighting performance features and elaborating on the trend analyses, the spokesman said.

PMR costs $500/mo for a one-year minimum, plus expenses and a one-time fee of $500 for installation of a user-purchased hardware monitor, all in addition to "the basic study cost" — not otherwise defined.

The third Soms offering, a specialized User Consultation (UC), is intended for the user of the smaller system or one faced with a known performance problem. Honeywell lets the user determine the support desired.

This can include training in the use of a hardware monitor, help in desigining a performance study or assistance in the performance of a study, possibly using Soms software packages, according to the spokesman.

UC service costs $500/day plus expenses for Honeywell personnel.

Facility Aids VM/CMS

(Continued from Page 29)

in IMS data bases to be used in QBE operations. Queries may access QBE by a PL/I Call or an APL Shared Variable, the company said: the system is not accessible from Cobol programs, the spokesman added.

While QBE supports access to either private or shared data, or both, it also permits the user to specify various levels of security and control against unauthorized intrusions, he continued.

The brochure from IBM indicates 10 types of "queries," more precisely interactive activities, that appear to provide all the facilities of the "language" from actual inquiries to file updates and changes of authorization of access.

As an IUP, QBE is made available "as is" with little support from IBM. It costs $325/mo, a fee that is waived after a year, but also requires — in addition to VM/CMS — IBM's PL/I Optimizer Transient Library (for $28/mo) and the VM Basic System Extensions (for $125/mo).

PROBLEM:

Many customers form their first impression of your company by phone. Busy signals can hurt your sales. A client who has to spend a long time waiting on "hold," or who gets cut off, might go to your competition.

Your phone system may also be making it more difficult for your staff to communicate with each other. Dialing and re-dialing busy numbers or waiting for a clear outside line wastes valuable time.

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DDP a Question of Business, Not DP Priorities

(Continued from Page 30)

be the topic of multiple seminars and papers.

The option of distributing or centralizing processing is, in fact, merely one more tool in the overall design of an integrated corporate information processing strategy.

We have a situation in which one new (or very old) question has been added to the system design process. This process now constitutes the following steps:

- Analyzing corporate data requirements (of both mechanized and nonmechanized data).
- Analyzing corporate user requirements.
- Constructing proper data structures.
- Selecting optimal software.

The new question is 'where should a user requirement or set of user requirements be processed?" When that question is answered, the physical residence for the data structures needed to support processing falls out.

Field vs. Headquarters

'This is, of course, the logical corollary of the "field"/"headquarters" (or "remote"/"central" in DP jargon) relationship mentioned above.

A simple distinction between "field" and "headquarters" data usage should be made here and then we can illustrate the conventional business situation showing file structure (and level of detail) being determined by the situation itself, i.e., how requirements determine the eventual distribution of processing.

Field or remote sites, when such a distinction from a central site exists in a firm, are characteristically involved in both creating and consuming data; they perform data entry and produce (or have the necessary data to produce) end-user reports.

Their end-user reports offer a finer level of detail than that required by central sites. If they do not, we are in the situation of producing redundant reports or posting from one site to another, a time vs. computing/transmission capability trade-off.

However, the most conventional situation is for headquarters to be a consumer of field data in an aggregate form that is, at a grosser level of detail than the field requires.

The accompanying figure illustrates how this practice works. Transactions (A^1, A^2, B^1, etc.;) enter the system in a conventional manner from cards or terminals, for example. The transactions are organized into a file (1) which can then be displayed by or retrieved from individual transaction, printed sequentially and summarized by transaction code(s).

When, typically, a summarization is of interest to both the field and central site, a transaction record of the summarization or aggregation is created for the field end-user (2) and at the same time transmitted or saved for transmission to the central site (3).

Upon receipt at the central site, the processing described above is then repeated with the difference that the remote's aggregate is now the central site's detailed transaction with the same availability for summarization (4), listing, display and so forth.

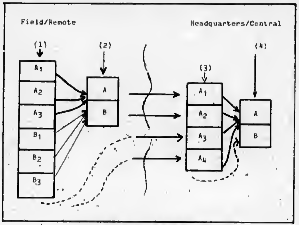
Along with the obvious placement of data near its end user at the appropriate level of detail, we have significantly reduced the amount of transmission involved (from [2] to [3] by modeling our data structures on an information requirement situation, rather than developing transmission conventions and content separately.

We have, therefore, illustrated a simple DDP structure with two end-user locations. Its hierarchical appearance reflects conventional practice rather than a mandatory approach.

More importantly, our structure has not been determined by a vendor-imposed DDP system nor is it the result of satisfying a set of conditions determined by an industry task force.

Although it might be implemented with off-the-shelf software and/or meet a set of arbitrary tests, the actual impetus for the distribution is the fact that the information problem itself had a distributed information requirement.

Our approach to that requirement corresponds to the above analysis steps with the addition of "Where shall it be done?" This is a question to which providing the answer is a corporate responsibility, not one to be met by outside formulas.



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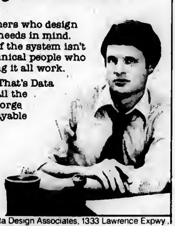

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Service Eyes Performance Of Investment Portfolios

CUPERTINO, Calif. — Banks, investment advisors and other financial institutions can access fund performance and current stock analysis data through an on-line time-sharing, service recently introduced by Tymshare, Inc.

The Performance/Valuation (Perval) system was designed for fund measurement and analysis and can produce, on demand, several types of reports and evaluations, according to a spokesman. Transaction registers, audit and broker reports, portfolio valuations and performance summaries are available on a monthly basis.

The system also has a transactions audit capability that allows users to check the accuracy of transactions against the firm's Tymquote, a data base of more than 31,000 securities, the spokesman added.

For further evaluation, Perval prepares a security profile that itemizes amounts and values of assets held within a composite fund identified by fund code and lists securities by type and stocks by industry groups.

A diversified portfolio valuation, also included, contains reports on the current market values of portfolios and the percent of total value, gain or loss, annual income, yield and price/-earnings ratio, the spokesman continued.

The system also produces quarterly fund summaries; equity and bond analyses; consolidated, netted-out reports; schedules of purchase and sales; reports on brokerage commissions; and purchase and sales analyses.

Further information on the on-line money management service can be obtained from Tymshare at 20705 Valley Green Drive, Cupertino, Calif. 95014.

Package Tracks Serial Numbers

DAYTON, Ohio — Software for wholesalers of products which require control records by serial number — such as major appliances, auto parts or firearms — is now available from NCR Corp.

NCR's Wholesale Distribution System features interactive DP with all information entered through a CRT terminal linked to an NCR I-8230 system. The user is led by prompting messages on the screen and data, once validated, is used to update files immediately, an NCR spokesman said.

In addition to easing the data entry operation, the package also supports the wholesaler or distributor making inquiries into the files to determine such things as the inventory level of selected items or status of customer orders or accounts, he continued.

The serial number subsystem produces reports that show when and from whom the item was received and when and to whom the item was sold, according to the spokesman. The system also includes order processing, accounts receivable, inventory control and sales analysis systems, he added.

This package can be used in conjunction with NCR's other interactive applications.

The software uses a 64K-byte or larger I-8230 with a 9.8M-byte disk system, a line printer and a CRT terminal. Written in ANS Cobol 74, it costs $6,250.

'Auto-System' Detailed For Wang Users

SPRINGFIELD, Va. — Users with Wang Laboratories, Inc. 2200 or WCS equipment can gain the primary benefit of a data base management system — data independence — through use of the Auto-System software, and a user's manual on the system is now available from the National Technical Information Service (NTIS), a spokesman said.

The announcement of the manual said Auto-System is a management tool to more efficiently create and control informational data bases and available DP resources. It eliminates; for many installations, the need for trained programmers for "standard" applications.

DP professionals will still be needed to create customized and analytical software, NTIS acknowledged, but this manual is said to introduce the system to managers, programmers and operators.

Auto-System was designed to run on Wang configurations with 32K bytes of main memory and either 5M-byte Wang 2230 or 10M-byte 2260 disk subsystems.

The 118-page manual, which the service admits is "partially illegible," is distributed on microfiche. Cataloged as Item No. AD-A055 877/5WC, it costs $3 from NTIS at 5285 Port Royal Road, Springfield, Va. 22161.

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IBM 1401 Programs Put on 3031

BROADVIEW, Ill. — When Mike O'Brien learned delivery of an IBM 3031 CPU had been moved up from March 1980 to September 1978, he began to scramble. The 3031 has no emulation for IBM 1401 programs, and O'Brien was running nearly 90 of them — to do key management of sales and inventory — on a 370/148.

As data center manager for the Amphenol Division of Bunker-Ramo Corp. here in Broadview, O'Brien was faced with two choices: reprogram the applications in Cobol while the 1401 programs lay idle or acquire a simulator software package to act as an interface while orderly reprogramming took place. "We really didn't have any choice," he said. "We put up SIM-14 from Dearborn Computer Co. to emulate our 1401 programs."

"We were well aware of the lack of 1400 support," software manager Bob Phillips added. "And we were on schedule with our conversion of those programs to Cobol. We planned to be converted by the time the 3031 was installed and running. But when delivery was stepped up, our situation became critical.

"As things go, the programs that hadn't yet been converted were some of the most important ones — jobs we just couldn't shut down."

"Installation of the package required some JCL changes for our 3M-byte system, but nothing major," Stan Peremsky, programming manager, said.

Multiuser Operating System Built for Z80, 8080, 8085

ORANGE, Calif. — A multiuser small business operating system for Z80, 8080 and 8085 microcomputers features an extended Basic language processor and a comprehensive file management system, according to its vendor, Panatec, Inc.

Pana/Basic's software capabilities include an interactive data entry and control function; relative; sequential and indexed sequential files; and various string-handling facilities. It also has a queued operational feature that allows I/O functions to continue while long-running programs operate in the background, a spokesman noted.

The operating system's file-handling capabilities are structured along 1974 Ansi Cobol specifications and include sequential, relative, indexed and consecutive access modes. Dynamic access is also included to allow one or more users to access the same file in more than one access mode, the spokesman continued.

The sytem reportedly handles multiple user accesses and automatically protects files during updates.

Four data formats are available within the Pana/Basic system: decimal, extended precision decimal, binary integer and string. Decimal accuracy is up to 15 digits in the extended precision mode, the spokesman claimed.

Pana/Basic costs an initial fee of $10,000 per installation plus royalities. It ranges in price from $120,000 to $150,000 for a one-time licensing agreement.

The company is also planning to introduce an Intel 8086 version of the software at the end of this year, it said from 1527 Orangewood Ave., Orange, Calif. 92668.

Facility Supports IMS Proclibs

OAK BROOK, Ill. — Described as a support facility for use in an IBM IMS data base mangement environment, the IMS-Proc/Analysis package is now available from Chicago Data Systems, Inc.

The package extracts information from the user's Procedure Library and provides both a cross-reference by real program name — "not DFSRRCOO" — and a cross-reference of Program Status Blocks (PSB) or Data Base Descriptors (DBD), a spokesman explained.

Additional features are said to include a formatted Proc listing wth symbolic resolution, a data set cross-reference including CATLG and volume table of contents (Vtoc) information, a program (PGM=) and a step-within-program cross-reference and a SYSOUT CLASS=FORM # cross-reference.

Syntax checking is also provided, the spokesman added.

The package is distributed in source code (ANS Cobol) with installation instructions and other documentation. It costs $3,000 and can be ordered from the vendor at Suite 150, 2805 Butterfield Road, Oak Brook, Ill. 60521.

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Setting Up Single Net

Diversified User Facing Consolidation

By Ronald A. Frank
CW Staff

HONOLULU — When a diversified conglomerate has many communications applications, each of which was developed independently, it becomes a problem to incorporate them into one network.

CW Photo by R. Frank

Francis Natori, manager of planning and standards at Dillingham Corp., adjusts GA SPC 16/40 used for 3780 emulation.

That is one of the major problems facing Francis Natori, manager of planning and standards in the information services department of Dillingham Corp.

Dillingham maintains its major DP center here, and as in many other companies, the data communications facilities grew as applications expanded on a piecemeal basis.

The DP center has several communications links with the mainland but some of these transmit data to Computab, Inc., a service bureau which now handles much of the company's DP work.

Beginning late this year, Dillingham will upgrade its present IBM 370/138 to a Model 148 as part of an overall plan to bring various DP operations in-house in a single system.

Part of this consolidation plan will include reconfiguration of the communications applications, Natori explained. All data transmitted to the DP center now is being handled by dual Integrated Communications Adapter (ICA) ports on the 138. With the installation of the 148, it will be necessary to get a 3704 front end from IBM to handle the same traffic plus other applications.

There are now two remote job entry (RJE) lines coming into Honolulu from Dillingham affiliate companies in the mainland. One of these uses Power/VS and transmits to the in-house DP center. The other transmits to Computab using Hasp on the 370/155 Installed there.

Time-Sharing Net

In addition, Dillingham uses the GE time-sharing network, which it accesses in Los Angeles using a General Automation, Inc. SP-16/40, which emulates a 3780 terminal both for input to the network and for input to the 138, Natori explained.

For accessing data at Computab, Dillingham uses three Burroughs TC 1700 terminals, which are interfaced to the 155. In

(Continued on Page 36)

Decoding, CRT Control Logic Combined in Terminal's Chip

RANDOLPH, N.J. — An intelligent CRT terminal with character decoding and CRT control logic combined in one LSI chip is available from Perkin-Elmer Corp.'s Terminals Division.

The Bantam terminal offers an upper and lower case character set, a 24-line-by-80-char. display with 7-by-10-char. matrix, self-diagnostic capabilities, cursor addressing and ASR 33 compatibility via the RS-232C interface.

Eleven asynchronous transmission rates are externally selectable from 110- to 9,600 bit/sec, Perkin-Elmer added. The Bantam is reportedly "the only CRT in its class to offer a transparent mode with displayable control characters to simplify host program debugging."

The Bantam's display can be switched from white on black to black on white and is set deep in the hood to reduce glare, a spokesman said. The desktop unit weighs 28 lb and measures 15 in. by 19 in. by 14 in.

Options include a "full overstrike APL model," a range of foreign language character sets, a Perkin-Elmer Pussycat page printer, a current loop interface and an RS-232C printer port.

A single Bantam costs $966, and 100-unit quantities cost $599 per unit, the vendor said from Randolph Park West, Rt. 10 & Emery Ave., Randolph, N.J. 07801.

Codex 6000 Line Gains Modem And Smart Network Processor

NEWTON, Mass. — Codex Corp. has added a smart network processor and two-wire, full-duplex modem to its 6000 Series of communications products.

The Model 6010 intelligent network processor (INP) can serve point-to-point networks, the vendor said, and can directly attach to a single port on a communications front-end processor or work as a feeder to a Codex 6030/6040 network.

The dual microprocessor-controlled INP combines information from up to 30 asynchronous devices using "proven" statistical concentration techniques and thus reduces requirements for multiple lines and related data communications equipment, the firm said.

All data is error-protected through the use of a CCITT X.25 Level 2-compatible, full-duplex link protocol, Codex noted, adding that on-line diagnostic routines are executed as a background function to enhance unit integrity.

As with other Series 6000 INPs, the Model 6010 allows centralized network control and monitoring, the vendor declared.

The product can reportedly be used with a variety of terminal types in either a dedicated or dial-up environment at data rates up to 1,200 bit/sec and link speeds up to 9,600 bit/sec. EIA RS-232C, current loop and MIL-STD-188C terminal port modules are available.

LSI 24/24 Modem

The Codex LSI 24/24 modem permits 2,400 bit/sec operation in a full-duplex mode on two-wire dial or dedicated lines.

The modem allows upgrade of networks operating with 1,200 bit/sec, full-duplex, two-wire modems such as the Bell Model 212. When used with full-duplex protocols such as Synchronous Data Link Control, High-Level Data Link Control and Burroughs Data Link Control, the units allows dial applications over satellite circuits without loss of throughput.

When used with a high-speed modem featuring a built-in multiplexer, the LSI 24/24 can cut network costs by providing dial-up, full-duplex 2,400 bit/sec tail circuits, the vendor added.

(Continued on Page 37)

Pacific Telecommunications Meet Scheduled for Honolulu in January

HONOLULU — The first Pacific Telecommunications Conference (PTC 79) is scheduled to be held here Jan. 8-9.

Appearing as keynote speaker will be H. Rex Lee, a former Federal Communications Commission member who is now chairman of the Public Service Satellite Corp. and has previously served as governor of American Samoa.

Topics to be discussed at the conference whose theme is "Telecommunications in the Pacific," include international data networks, packet switching, satellite systems, electronic mail, electronic funds transfer and similar issues of interest to users in government and business.

PTC 79 is being organized by the Department of Electrical Engineering and Social Science Research Institute at the University of Hawaii in Manoa. The conference is being sponsored by the IEEE Communications Society, the Department of Planning and Economic Development for Hawaii and the Hawaii Telecommunications Association.

Among sessions to be held at the meeting are a panel discussion on transborder data transmission, chaired by William Fishman of the National Telecommunications and Information Administration (NTIA); telecommunications and government policy, chaired by Donald Sayer of IBM; and technological innovation in telecommunications.

The program will follow two paths, one designed for those concerned with telecommunications technology and a second dealing with the economic, social and regulatory aspects of communications.

The conference will be held at the Ilikai Hotel and the registration fee is $100. Details are available from Dr. Richard J. Barber, director of the Hawaii Research Center for Futures Study, University of Hawaii, 2424 Maile Way No. 704, Honolulu, Hawaii 96822.

Qantex Unveils RS-232 Interface

HAUPPAUGE, N.Y. — An intelligent RS-232 interface that links Qantex data storage systems to RS-232-compatible communications channels and CPU ports has been announced by the Qantex division of North Atlantic Industries, Inc.

The Model 86-686 features a Motorola, Inc. 6802 microprocessor and permits automatic execution of search and edit functions as well as rereading and rewriting of memory upon detection of read/-write errors, the vendor stated. The interface reportedly handles continuous data transmission, switches between data rates from 55 bit/sec to 9,600 bit/sec, and supports up to four independent cartridge tape transports.

The unit costs $900, Qantex said from 60 Plant Ave., Hauppauge, N.Y. 11787.

Columbia Adds Buffer

BALTIMORE — Columbia Data Products, Inc. has Introduced a microprocessor-controlled, solid-state Data Buffer for storing up to 16,000 characters.

The unit was designed to connect asynchronous RS-232 or teletypewriter-compatible terminals with a modem or CPU for store-and-forward applications.

Dual universal asynchronous receiver transmitters reportedly allow on-line speed conversion; speeds from 110- to 19.2k bit/sec are selectable.

Standard features include search and edit, auto-answer, answer-back, line mode, transparency mode, automatic line feed and self-contained diagnostics.

The Data Buffer costs $995 from Columbia at 6655 Amberton Drive, Baltimore, Md. 21227.

Diversified User Planning To Consolidate Operations

(Continued from Page 35)

addition, a System/3 Model 10 in Seattle utilizes Hasp to transmit data through a communications adapter to the service bureau.

In all, about 50 Dillingham divisions send data to Hawaii in one form or another for processing. This includes financial reporting, payroll and a vessel costing system for the Foss Launch & Tug Co. maritime division.

Expansion Necessary

The two 4,800 bit/sec lines coming into Hawaii will need to be expanded when all applications are consolidated on the 148, Natori said. These links are now tied into a tandem tie line system in Los Angeles for both voice and data traffic.

The company now has six IBM System/34s on order, which Natori said will be installed at subsidiaries to act as preprocessors or remote front ends to the 148, which will be operating under VM/370. The 34s were ordered because delivery of systems involves a waiting period, Natori explained, but he said he may ultimately decide on another processor to perform the remote front-end functions.

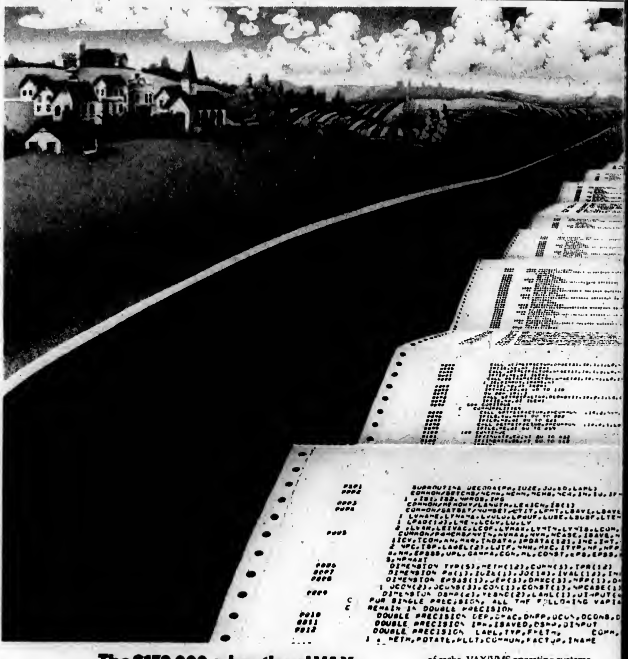
A possibility is the IBM 8100, but no decision has been made yet.

The communications upgrade is a second phase of the consolidation effort at Dillingham and it may include an implementation of IBM's Synchronous Data Link Control (SDLC), Natori explained.

The present private lines might be augmented with a public data service such as Telenet if that fits in with the communications needs, he said.

A consultant is making some recommendations about where to put the DP/data communications operation. In the meantime, Natori is taking things one step at a time.

"First we have to bring everything in-house, then we'll see what the next step is," he said.



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Sperry Rand Using Bell's EPSCS in Private Net

BEDMINSTER, N.J. — Sperry Rand Corp. has recently incorporated Bell's Enhanced Private Switched Communications Services (EPSCS) in its private-line network, joining about 38,000 telephones at 220 locations throughout the U.S. and Canada.

Sperry's in-house network — Sperrynet — uses EPSCS to "automatically" redirect telephone calls along "the most economical route available" in the event a primary path is busy. Other accessible EPSCS services are tie-lines, Wats and Foreign Exchange.

In addition, Sperry users are provided "up-to-the-minute" status reports on phone traffic within the network and may use that information to reconfigure for "special calling situations," the firm stated.

With EPSCS, Sperry is said to gain an unprecedented level of control over its diverse telecommunications activities. For example, a customer network control center at the New York City corporate headquarters allows continual monitoring of traffic flow and rapid identification and resolution of any traffic problems, as well as detailed reports of network use.

"We studied the situation for four years," Bornheimer recalled. "We knew our tandem tie network had just about reached its limit in usefulness, so we were looking for a system that would give us improved service, greater flexibility and reduced corporate expense. Bell's new electronic switching service had what we were looking for."

Sperrynet will be linked to specially equipped Bell switching centers in Atlanta; Philadelphia; St. Paul, Minn.; and Los Angeles. The entire network will be maintained and supported by Bell's administrative control center in Chicago.

Sperry is the fourth company to use EPSCS, a Bell source noted. The other users are Xerox Corp., RCA and Mobil Corp.

Indiana U. Seeks Papers

BLOOMINGTON, Ind. — Indiana University has issued a call for papers for its sixth annual Computer Network Conference on Academic Computing Applications to be held April 6.

Titles and abstracts of papers should be submitted by Jan. 1 for peer review and selection, the university said. Completed papers that are selected, along with a 75-word autobiographical "sketch," are due Feb. 15.

The conference will include presentations in nontechnical as well as technical areas of academic computing and vendors are invited to demonstrate new products.

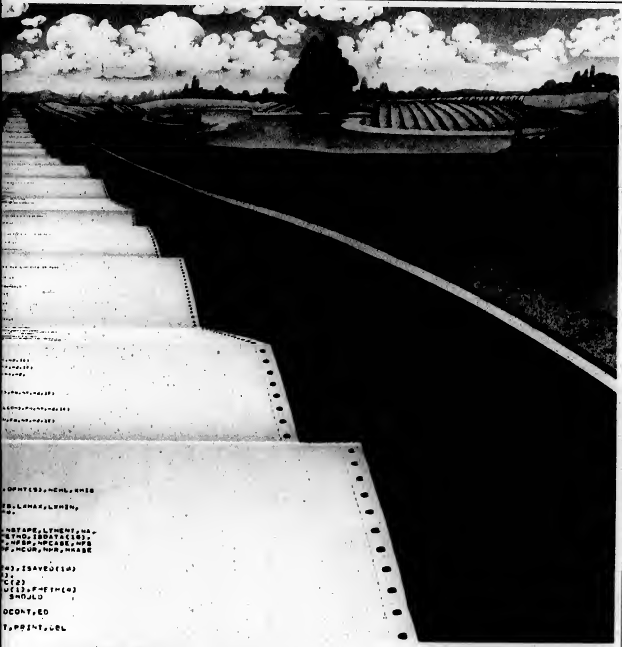
The university's Computer Network Operations Advisory Committee expressed particular interest in papers on dedicated computer applications. Abstracts should be sent to Mickey Stentz, Wrubel Computing Center, Memorial Hall West 015, Indiana University, Bloomington, Ind. 47401.

Codex Adds To 6000 Line

(Continued from Page 35)

The modem can complement voice digitizers and can surpass the throughput of 4,800 bit/sec half-duplex modems when used in dial applications with half-duplex protocols — depending on message block characteristics, transmission delay and line turnaround.

The Model 6010 INP costs $4,250; associated dual-channel modules cost $325. The LSI 24/24 modem costs $4,760 or may be leased at $130/mo, $110/mo or $105/mo for one-, two- or three-year terms, respectively, Codex said from 15 Riverdale Ave., Newton, Mass. 02195.



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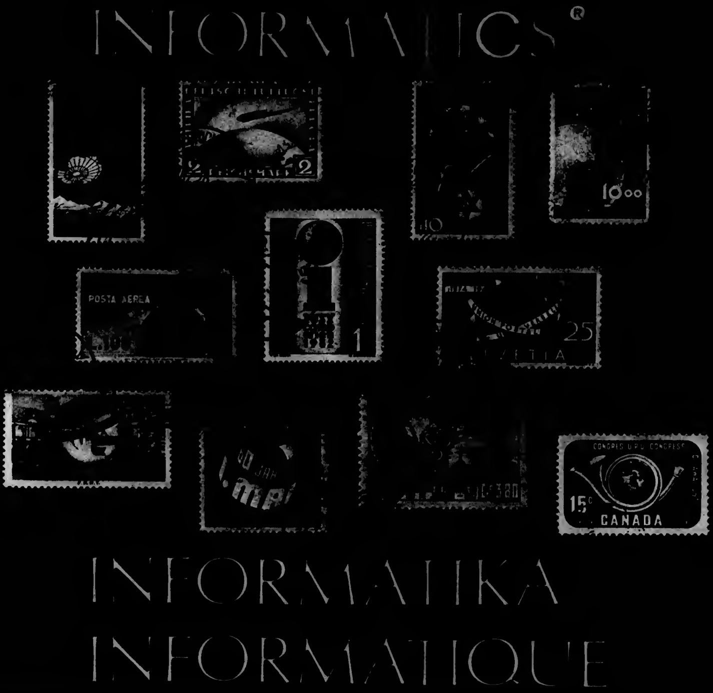

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EIA Bypass Device Also Debuts

Switch for DEC Users Among Four From IDS

LINCOLN, R.I. — A selector switch for Digital Equipment Corp. Word System 78 users, an EIA bypass switch, a telephone line crossover switch and an analog A-B selector switch/monitor have been unveiled by International Data Sciences, Inc.

The Model 8556-D A-B selector switch allows two Word System 78s to share a printer. The 50-pin unit allows the operator to manually switch pins 3 through 50 of any two 50-wire inputs into a 50-wire output.

All connections are made at the rear panel through three 50-pin female connectors, a spokesman said.

A two-position rotary switch on the unit's front panel allows the operator to switch any 50-wire input from the rear panel connector — labeled "C" — to either of the two connectors labeled "A" and "B," the vendor stated.

The Model 8538-D EIA bypass switch allows operators to switch a terminal chained off-line into the EIA interface, according to the spokesman.

This unit features a two-position switch mounted on the front panel that permits a chained terminal to be on-line or bypassed, he explained, adding that the entire EIA 25-pin interface is switched.

Crossover Switch

The Model 8540-D telephone line crossover switch allows the operator to manually reverse the two- or four-wire connection between two modems and two telephone lines.

The device offers a two-position switch on the front panel that lets the operator place the unit in either normal or reverse modes, the spokesman said. A chaining function permits a single modem or telephone line to support several other modems or telephone lines.

The Model 8917 analog A-B selector switch/monitor contains the switching and paralleling monitor functions for four independent data channels at the four-wire, full-duplex modem-telephone line interface.

This unit operates in concert with the Model 8967 controller and power module, IDS said. Up to eight Model 8917s are housed within a single Model 8967 in the vendor's Model 8903 cage assembly.

The entire 32-channel system in turn mounts in the standard 19-in. cabinet of a technical control center. Remote control of the entire system is accomplished via IDS' Series 8900R remote control system.

Bulk switching of up to eight Model 8917s is accomplished by means of a Master A-B switch on the Model 8967 and individual channels are switched by an A-B switch on each Model 8917.

The Model 8556-D, 8538-D, 8540-D and 8917 cost $250, $290, $165 and $575, respectively, IDS said from 7 Wellington Road, Lincoln, R.I. 02865.

Modems Built For Satellite Nets

BOHEMIA, N.Y. — A series of single-channel-per-carrier modems from American Modem Corp. consists of companion transmitter and receiver units: the Model 1463T encoder/modulator and the Model 1463R demodulator/decoder.

The Series 1463 QPSK modems were designed for satellite communications networks where the transponder is power-limited because of a large number of single channels.

For Point-to-Point Service

The Series 1463 modems are suitable for use in point-to-point dedicated service and incorporate solid-state integrated circuits for maximum reliability and low power consumption, a spokesman said. Error-correcting encoding and decoding is featured.

Standard interfaces available with the Series 1463 modems are V35, WE302 and RS-232 (or V24). Other interfaces are offered on request.

The series' transmitter unit costs $2,800 and the receiver unit costs $4,915, the vendor said from 160 Wilbur Place, Bohemia, N.Y. 11716.

Correction

Motorola, Inc., not Motorola Semiconductor Products, Inc., owns the Government Electronics Division at 8201 E. McDowell Road, Scottsdale, Ariz. 85252 as reported in "Motorola Extends DES Key Management" [CW, Oct. 2].

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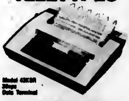

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Processor Helps Develop Transaction-Based Coding

NEW YORK — Decision Strategy Corp. calls its Taps Transaction Processor (TTP) for distributed DP "a complete environment for developing transaction-based applications."

Users build transactions interactively from a CRT terminal and need only code for logical comparisons and computations," the vendor said. The processor provides data security, menus, editing, temporary data storage, data collection, network and data base recovery, data paging, documentation and terminal operator control.

TTP interfaces to any communications monitor or provides its own. In addition, it reportedly fits all terminal types.

Functions Without User Code

The device is said to allow addition, modification, deletion and search of data without any user code — "any complex or boolean question can be asked from the CRT" — and retrieval is based on "customizable" English language "aliases" for each data element.

The results of an inquiry can be displayed on a standard screen format or the terminal operator can use the Decision Strategy Real-Time Report Writer to design another screen format "on the fly," the vendor explained.

Totally Reentrant

TTP is "totally reentrant" and is said to minimize line loads and multiple tasks. The featured inverted file structure reportedly maximizes throughput.

Decision Strategy termed the TTP transaction code "90+% portable among IBM mainframes" and the following minicomputers: the Digital Equipment Corp. PDP-11; the Hewlett-Packard Co. 3000 series; Interdata, Inc. Model 32s; Tandem Computers, Inc. minis; and IBM Series/ls.

The TTP costs $25,000 and up, with discounts for multiple sites. Decision Strategy is at 708 Third Ave., New York, N.Y. 10017.

Modem Runs Full-Duplex At Distances to 50 Miles

WHEELING, Ill. — The Gandalf Data, Inc. Model LDM 404B limited-distance modem was designed for full-duplex synchronous communications at 4,800 bit/sec at distances to 50 miles.

The LDM 404B operates over 4-wire, voice-grade Bell 3002 lines — conditioned or unconditioned — as well as T Carrier and most other carrier systems, Gandalf said.

The modem's transmitter, uses quaternary amplitude modulation followed by frequency translation to a narrow band centered in the voice channel, the firm continued, noting that the receiver employs delay equalization with digital filtering techniques.

Installation is said to require no special tools or test equipment and alignment is performed with a built-in meter that performs self-checking.

The interface meets RS-232C and CCITT V.24 requirements, Gandalf added, and a stand-alone or rack-mounted version is offered.

The LDM 404B modem costs $1,200, the firm said from 1019 S. Noel, Wheeling, Ill. 60090.

Data Transfers Speeded With Paper Tape Emulator

MIDDLETOWN, Conn. — A microprocessor-controlled paper tape emulator that uses magnetic tape cassettes to accelerate data transfer has been announced by Raymond Engineering, Inc.'s Raycorder Products Division.

The Model 6801 operates with either a single or dual Raycorder digital cassette transport and is directly compatible with conventional paper tape systems, the vendor said.

Communications is via a serial asynchronous interface that conforms to EIA Standard RS-232C, Raycorder said, adding this design assures simplicity of operation and commonality with existing paper tape reader and punch equipment.

Transfer Rate

The data transfer rate is selectable in eight speeds from 110 to 9,600 bit/sec. Operating modes include local, on-line and off-line, and manually operated controls and visual indicators allow the user to select basic functions.

Electronically programmable read-only memory software is available.

The dual transport paper tape emulator costs $2,995, Raycorder said from 217 Smith St., Middletown, Conn. 06457.

Device Tests Phone Lines

LOS ANGELES — Teleprocessing Products Co.'s TP-260 data line tester reportedly allows testing of both dedicated and dial-up telephone lines and gives a quick indication of suitability for transmission.

Tests can be performed by "unskilled persons" with results read directly in terms of tariffed requirements for data lines, the firm claimed.

A combination 1,004-Hz tone generator, audio receiver and decibel meter are included to diagnose common phone line problems, the firm continued, adding that the TP-260 is about twice the size of a transistor radio.

The device costs $260 off the shelf, Teleprocessing Products said from 11163 W. Pico Blvd., Los Angeles, Calif. 90064.

Former IBM Site

First User Calls Omega 480 'Just Super'

By Howard A. Karten
CW Staff

DETROIT — The Omega 480 is "just super," according to one of its first users, who is pleased with both the system's performance and the software support he has gotten so far from the mainframe's vendor, Control Data Corp.

"Since we installed the system in March of this year" — it was announced by CDC 18 months ago [CW, May 23, 1977] — "it's been virtually maintenance-free. We have not had a single problem with the CPU itself, and the Omega just runs and runs and runs," according to Jim Glutting, assistant DP manager of Transco Corp. here.

Transco, which ships 2,000 to 4,000 cars every day from manufacturers to auto dealers around the country, relies heavily on its system for all phases of this operation. With that kind of volume — and no backup computer — it can't afford lengthy delays.

"The only problem we had with the system was losing the time-of-day clock, and that happened because the local controller for one of the CRTs was running in burst mode, instead of in byte mode, so it wasn't really an Omega problem," Glutting recounted.

Several Alternatives

Before installing the Omega, Transco had been using an IBM 370/125, which was overloaded. To alleviate this problem, it considered several alternatives: a larger IBM system, an IBM-compatible system made by Itel Corp. or the Omega. When contractual difficulties developed with Itel and the best delivery date IBM could offer was 18 months off, Transco finally opted for the Omega, designed and manufactured by IPL systems, Inc. of Waltham, Mass..

Transco's original plan had been to bring in a Model 1 Omega system, then upgrade it about September to a Model 2. However, the upgrade kit was not available at the time, and since the arrangement of terms with CDC was favorable and the idea of a backup was attractive, Transco decided to put the Model 2 with its older brother, instead of simply replacing it.

Glutting is particularly pleased with the software support from CDC. "The software support that I've gotten isn't even comparable to IBM. There were three or four fixes that I wanted to put into the operating system that were not supported by IBM. I told CDC about it, and the next day it came out here with a fix," he recalled.

"IBM provides no direct support," Glutting continued. "Once you lose your CPU, you lose your support. There were a lot of things I wanted to do that weren't allowed the way IBM software was set up.

"For example, with Release 34 of DOS/VS, IBM dropped all Isam support for 3330 Model 11s and 3350 [disk drives]. We had 25 Isam files we wanted to use, and of course IBM's answer was to convert them to Vsam. I didn't want to do that, so I told CDC about it, and the next day it came out with a fix, which is running today."

One unusual aspect of Transco's installation concerns preventive maintenance. Although a CDC spokesman said the company recommends preventive maintenance being done once a month for two hours (with more detailed maintenance performed quarterly, semiannually and annually), Glutting said he has had no preventive maintenance performed thus far.

The Omega Model 1 used by the company has 1M byte of memory. The newer one has 2M bytes. Both run under DOS/VS using

(Continued on Page 42)

Two 370-Compatible Systems Unveiled by California Group

By E. Drake Lundell Jr.
CW Staff

NORTHRIDGE, Calif. — A group of minicomputer designers has gotten together here and designed replacements for two IBM mainframes that reportedly promise increased performance at "significantly" reduced prices.

Unfortunately, however, end-user marketing plans for the Computer Information Technology Engineering Laboratories Corp. (Citel) systems are not completely formed at this time.

The first two models of the Citel 30 series — the models 3 and 4 — will initially be available as replacements for the IBM 370/138 and 370/148. The firm said it will eventually offer systems that cover the complete range of IBM Series 30 products.

The present systems run the IBM OS/VS1, OS/VS2, DOS/VS, VM370 and MVS operating systems, according to Donald R. Wilshe, Citel president.

The units can contain up to 16M bytes of 300 nsec dynamic MOS memory, Wilshe said, and feature a processor cycle time of 100 nsec. They use a multiple bus structure with 32-bit-wide paths to provide a data flow rate of up to 2G bit/sec internally.

Presently the logic circuitry is T^2L but Citel will use emitter-coupled logic on its larger machines in order to increase the speed by six to eight times, Wilshe said.

All processor functions are controlled by reloadable control storage and the units feature 16 general-purpose and floating point registers.

In addition to the 370 instruction set, the Citel 30 machines have extended precision floating point, an interval timer, store-and-fetch protect, a byte-oriented operand feature, instruction retry, dynamic address translation, compare-and-swap, compare-and-swap double, extended control mode, program event recording, time-of-day clock with clock comparator, multiprocessor capability, remote diagnostics and an integrated logic/test analyzer as standard features.

The Citel systems implement IBM's Extended Control Program Storage in microcode, Wilshe said, and feature a 64-bit, 500 nsec multiply and hardware-assisted divide feature.

Five Channels Standard

Five channels are standard on each system — one byte multiplexer and four block multiplexers, each with a data rate of up to 3M byte/sec.

Expected end-user price of the system will be about $460,000 for a Model 3 with 1M byte of memory and about $650,000 for a Model 4 with 2M bytes of main memory.

Most of the designers for the systems came from Hodge and Taylor Associates and have done computer architecture design work for many of the minicomputer manufacturers, including Computer Automation, General Automation, Varian, Interdata and Microdata, according to Wilshe.

All members of the engineering design team are stockholders in the venture.

The equipment is being manufactured by Instrumentation Technology Systems, another backer of the firm.

Initial deliveries of the systems will be "early" in 1979. Wilshe said Citel is looking for large-volume distributors with their own service and sales networks to sell and service the product, but he did not rule out direct marketing by Citel.

Citel presently has commitments from several third-party maintenance firms to handle the upkeep on the systems if Citel decides on direct marketing. Furthermore, Wilshe claimed lease money is already lined up if the systems are sold directly.

Although the systems use a 4-bit slice-based architecture, Wilshe said they are not minicomputers and would be good for multiprocessor applications. The systems are available with interfaces for both minicomputer-type peripherals and IBM 370-compatible peripherals, he added.

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Storage Hierarchy Trends — Part 2

Systems — Not Devices — Stressed for Future

By George Rose
Special to CW

For a number of reasons, the on-line storage hierarchy for large computer systems has continued to expand for the last 10 years. Semiconductor storage has replaced core storage, main storage has increased in size and speed, magnetics has undergone refinements and various solid-state developments have been occurring.

Magnetic recording did not stand still while solid-state improvements were taking place. Although moving-head disk technology is more mature, progress has been substantial and should continue.

Performance improvements have been made in all areas — faster head movement, increased rotational speed and multiplexed data transfer.

However, the most dramatic and consistent advance has been made in recording density, which increases both data transfer rate and device storage capacity. The areal density has increased from 50,000 bit/sq. in. in the IBM 1311 disk to 3 million bit/sq. in. in the IBM 3350.

Range of Alternatives

Figure 1 depicts the trend of density increases in IBM moving-head disk products over time. This trend has resulted in a breadth of moving-head disk devices in large data centers, which can typically range from 100M bytes to 800M bytes in storage capacity. Devices with a capacity of 1G byte may be available within the next few years.

In effect, a storage hierarchy of moving-head disks exists within the total storage hierarchy with lower capacity, higher performance at one end and, at the other end, large capacity and lower performance. With this range of alternatives, the fixed media mode of operation has become feasible in many data centers, even when some of the media are removable.

With the increase in rigid-disk areal density, a decrease of more than one order of magnitude in the cost of disk storage capacity has occurred in slightly more than a decade, as illustrated in Figure 2. Reductions in storage cost are tied to density increases and are expected to continue in the future.

Mass Storage

Moving-head disk technology can presently satisfy capacity requirements in excess of 1,010 bytes for large data centers. When the on-line capacity requirement is about 1,011 bytes, products commonly termed "mass storage" are available.

Although mass storage products are not new — Ampex Corp.'s Terabit was developed in the 1970s — their use on IBM systems did not receive broad attention until IBM announced the 3850 mass storage system in 1974.

Freed from the restriction to be compatible with conventional magnetic tape, higher recording densities were achieved and the on-line hierarchy was expanded.

The IBM system — and others — rely on magnetics for data storage. However, the organization of mass storage involves a departure from the usual peripheral approach.

Within these systems, the storage and retrieval of data are largely independent of how application programs process the data.

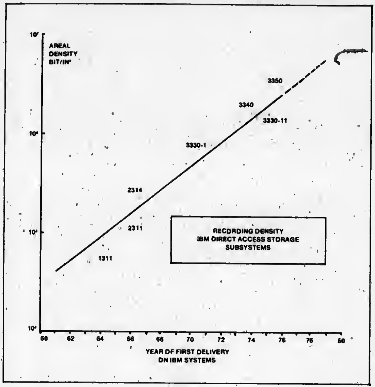

Figure 1

Assisted by the flexibility of microcode and writable control storage, IBM introduced a sophisticated level of outboard intelligence in its mass storage system.

Hierarchical Control

A number of software products have also become available to manage data in the hierarchy. As the hierachy grows in size and the levels within the hierarchy increase, automated control becomes an important goal.

Advances in solid-state technology can help to make the overhead cost of such control reasonable and justifiable. One can envision the introduction of microprocessor and cache developments at appropriate levels to present the appearance of a more homogeneous, total data storage facility.

The increasing price/performance effectiveness of solid-state logic is nearly as dramatic as that of solid-state memory, and it should do for control of the hierarchy what memory has done for data storage. A reduction in human intervention and external software control should correspondingly evolve.

These trends are associated with fundamental questions relative to the storage and processing of data in large system environments. The concepts of centralized and distributed processing, or combinations thereof, are subjects which involve analysis of where data is stored and processed.

Increasingly, the evaluation of data storage alternatives will shift from emphasis on devices to emphasis on systems which can support the management and movement of data within a hierarchy and within a network of hierarchies.

Rose is a senior member of the Information Systems Staff at Western Electric Co. in Greensboro, N.C.

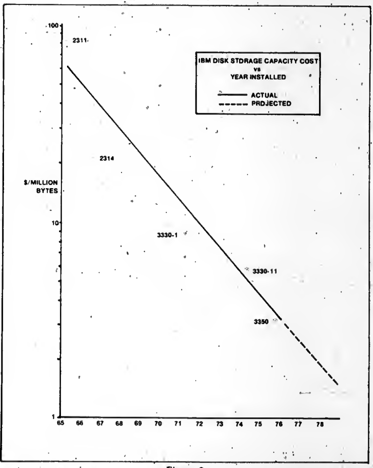

Figure 2

Omega 480 Called 'Super'

(Continued from Page 41)

Power VS and Task/Master from Turnkey Systems, Inc.

When the Model 2 is turned over to the company for use, Glutting plans to share direct access storage devices between the two systems.

Humans Still Important

Despite the user's heavy reliance on DP for keeping track of its business, it still relies heavily on human beings in the area of load-makeup, which involves deciding what mix of cars to load on an auto carrier.

A wide mix of vehicle sizes and heights, tire sizes, bumper configurations and other factors determine which vehicles can be shipped together, Glutting explained. Breaking this data down into rules usable by a computer would be highly complex, Glutting noted. As a result, the task is done manually.

"The guy who does this has been doing it for 20 years, so he's pretty good at it by now," Glutting commented.

In summarizing Transco's experience with the Omega system, Glutting mentioned the "security blanket" aspect of staying with IBM. "We felt we were slighted by IBM because we were a smaller account, and we felt we really didn't get the support and service we should have had.

"IBM is a security blanket for a lot of people but, frankly, I can't see what security [potential converts] are leaving. For example, the software support was zero, compared to what we have now," he said.

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Hitachi M-200H Seen Largest, Fastest CPU

By Howard A. Karten
CW Staff

TOKYO — Hitachi Ltd., the Japanese computer maker, claims its M-200H will be the world's largest, fastest general-purpose computer, according to a recent issue of *EDP Japan Report* (EDP/JR).

Scheduled to be introduced in Japan in mid-1979 [CW, Sept. 18], the system is said to be 60% to 70% more powerful than IBM's 3033, the biweekly newsletter reported, as well as 10% faster than Fujitsu's M-200.

And, although Japanese computer manufacturers do not market their products in the U.S., the system might nevertheless be coming to this country. Itel Corp. is reportedly planning to develop a new high end of its Advanced System series which will be based on the M-200H.

With a main storage capacity ranging from 4M to 16M bytes — or twice as much as an IBM 3033 uniprocessor — the Hitachi system will rent for $158,000 monthly (at present rates of exchange) when first shipments begin in the second half of 1979, according to EDP/JR.

The system, which uses NMOS, 16K bit/chip technology for storage, can be used in multiprocessor configurations with up to four processors connected.

NEC Introduction

Another Japanese manufacturer, Nippon Electric Co. (NEC), also recently introduced a large, fast system, the Acos 900 Model 2. This system — actually two enhanced Acos 900 Model 1 systems in a multiprocessor configuration — reportedly has a processing capacity of 11.2 million instruction/sec (Mips) vs. 12.8 Mips reported for the Hitachi unit.

Like the Hitachi system, the NEC unit can have from 4M bytes to 16M bytes per CPU and uses 16K bit/chip NMOS architecture.

However, the NEC unit has an average instruction execution time, using the Gibson-mix-method of estimating, of 89.3 nsec (for a multiprocessor configuration) vs. a figure of 78 nsec for the M-200H.

Rental Fee

The Acos system will rent for about $110,000/mo, EDP/JR reported, when deliveries commence shortly. At about the same time, Fujitsu Ltd. is expected to begin shipments of its M-200, with the first going to Kyoto University here.

In addition to the large-scale mainframes, a mass-storage system developed jointly by Fujitsu and Hitachi, the H-8523, is being marketed by Hitachi. Although the company has not yet officially announced the system — "for some 'political' reason," EDP/JR speculated — the Hitachi M-200H product catalog identified that storage system as having four models, with capacities ranging from 35G to 216G bytes.

The H-8523 is compatible with IBM's 3850 mass storage system, the report said, and will be officially announced in April jointly by Fujitsu, Hitachi, Nippon Peripheral Ltd. (NPL), NEC, Toshiba and NTT.

Overseas Deliveries

Overseas deliveries of the system are slated to begin in the second half of 1979, but it will not be marketed in the U.S., following Japanese custom.

In addition to the 3850-compatible system, the above group is also reported to be developing a medium-sized mass storage system with Mastore Corp., a recently formed California company. Initial deliveries of that system are scheduled for the first quarter of 1980.

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Impact of IBM's 30 Series

Changes for Users Seen in Third-Party Market

By Howard A. Karten
CW Staff

TROY, Mich. — The introduction of IBM 30 Series systems has meant that users can expect new levels of price/-performance in the third-party marketplace, according to CMI Corp., which is heavily involved in this market.

The company's *Third-Party Market Newsletter* for September noted that supply exceeds demand for 360 systems, with CPUs generally selling for approximately 10% of IBM list. The bottom-end 360/20s are still in demand as small, stand-alone systems, the firm added.

Supply is ample for 370/125s, 135s and 145s, the company noted, with the market for the latter two systems stable. By contrast, the supply of 138s, 148s and 168s is limited, with the latter in particularly short supply.

The ample supply of the three smaller systems, as well as the 155, has forced prices down to 30% to 35% of IBM list, while the more limited supply of other systems — such as the 158, 168, 138 and 148 — has resulted in prices ranging from 60% to 80% of list.

An older 155 with dynamic address translation feature would be an "excellent price/-performer" as a 148 alternative, according to the report, while the same system without that feature would be priced right for 360 users.

Conditions in the I/O market are essentially unchanged, the report continued, with demand for tape and disk continuing strong as installations grow in size. It is often more difficult to obtain an I/O controller than a CPU, the report stressed.

Supplies of 3000 series disk and tape drives are limited, resulting in prices of 50% to 60% of list for the disks and 70% to 85% of list for the tapes. By contrast, the older 2000 series tapes and disks are in ample and limited supply, respectively, with prices forced down to roughly 20% of list on both. However, limited supplies of both 1400 and 2000 series card equipment have kept the prices up to IBM list on both series, CMI said.

There is little activity in the System/3 market, the report noted. Most models of the system are in ample supply.

System/32s are selling for 65% to 75% of list, while limited supplies of System/34s have resulted in those systems usually selling for the full IBM list price.

Calling the System 3 Model 15 "the best price/performer" in that line, the newsletter noted that those systems generally bring 75% to 85% of IBM list. The most economical buy in the System 3 line is the Model 10, which typically sells for only 30% to 50% of list, CMI said.

In addition to the activity in the System/3 CPU market, I/O gear for the systems is in limited supply, bringing 70% to 80% of original list, the report indicated.

"As the volume of business increases and new products are announced, we are amazed at the seemingly insatiable appetite for computer power," the report concluded. CMI can be reached at 755 W. Big Beaver Road, Troy, Mich. 48084

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Univac Uses Univac to Manage Parts Inventory

ELK GROVE VILLAGE, Ill. — Univac has, not surprisingly, turned to a Univac computer complex to manage an inventory of 77,000 spare parts valued at $35 million.

Besides the bread-and-butter inventory applications, which involve shipping 3,600 orders a day from the 230,000 sq.-ft Worldwide Distribution Center (WDC) here, the computer system is really helpful in emergency situations, Univac said.

For example, on Sunday, March 5, this year, an automobile careened out of control on an expressway in the Oak Brook area, about 17 miles west of downtown Chicago. The car jumped the curb and plowed into a transformer, resulting in a power loss in the immediate area.

One of the many buildings affected by the accident was Computer Sciences Corp.'s (CSC) computer complex, one of the links in CSC's nationwide network of service centers. All six of the Univac mainframes in the center were immediately knocked out.

Power Supplies Needed

While power was being restored, 13 different types of power supplies were needed to get the computers operational again.

A call for the power supplies was sent to the WDC by the Mount Prospect Univac Customer Engineering branch in Arlington Heights, which is responsible for servicing CSC.

WDC had 11 of the required power supplies on hand and, to save time, had one ot its own staff deliver the components to the customer site rather than wait for the material to be picked up.

After the initial delivery of the 11 items, four of the 1108 systems were restored to service in less than three hours after the power loss.

One of the remaining two power supplies needed was soon located at another field location, and arrangements were made for immediate shipping to the customer site. The last supply was obtained from a manufacturing location.

Responding to "fire alarms" of this type is an ordinary occurrence — scarcely a week goes by without an emergency call being received in the center to help a customer faced with an unexpected problem "stay on the air." And often the emergency occurs on a weekend or holiday.

But the more normal part of the business is managing Univac's worldwide inventory, valued at more than $125 million.

The focal point of the distribution network control is the Univac Worldwide Support Material organization, headquartered at WDC and headed by A.A. Wimmell.

A number of depot distribution centers backup the facility here. These include the European Distribution Center in Sassenheim, The Netherlands, with an inventory valued at about $6 million and the capability of supplying 75% of European emergency requirements.

Other depots are in Irvine and Los Angeles, Calif., Houston and Voorhees Township, N.J. In addition, about 1,500 smaller customer engineering warehouses and storerooms are maintained by Univac throughout the world.

Speeding Up Delivery

"We are using advanced material-handling techniques at all of our major locations to expedite the flow of parts to our customers. We recognize the mounting costs and inconveniences caused to our clients, the longer equipment downtime lasts," Wimmell said.

The Worldwide Support Material Center locations are chosen on the basis of their service and transportation facilities.

To replenish its stocks, WDC receives replacements from manufacturing plants in Roseville, Minn., Salt Lake City, Utah, Bristol, Tenn., and Cupertino and Irvine, Calif., as well as from its own repair services activity and a variety of vendors.

Two computers, a Univac 1108 and an 1110 system, are used for the distribution and inventory control system. The 1108 is the hub of a Material Control System (MCS) which provides for automatic replenishment of stocks to customer engineering field branches and subsidiaries worldwide.

The 1110 system is used for the spare parts distribution system and processes in-house parts movements, updates inventory records, controls ordering and depot replenishment, produces shipping documents and records warehouse transactions. If needed, the 1108 system can act as a backup to the 1110 processor.

One of the functions of the Elk Grove facility is the distribution of Field Change Order (FCO) materials, which include kits of modification materials and engineering instructions.

Orders are received from offices throughout the world by telephone, Telex and computer input, depending on the urgency required.

The center is also responsible for providing all of the documentation needed for export. This is a sizeable task considering the varying paperwork requirements of the different countries for the importation of computer parts.

A feature of the Elk Grove Center is the Parts Repair Center and a repair development laboratory which researches the best methods to repair components returned from customers. The report diagnostics are concentrated on detecting faults in printed circuit boards.

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Mini Helps Unclog Paperwork Bottleneck

BOSTON — Rapid growth was multiplying Brewster Wallcovering Co.'s paperwork volume and complicating management of its day-to-day operations until the wallcovering distributor automated its business functions with its first inhouse minicomputer system.

Today, Brewster has reportedly trimmed its paperwork requirements and tightened control over such vital business functions as inventory control and accounts receivable, and company vice-president Robert Holzman traced these benefits at least in part to the recently acquired mini.

Built around a Microdata Corp. Reality minicomputer with three printers and four CRT terminals, the system helps Brewster manage its billing and shipping, generate credit reports, control inventory and process orders, Holzman said.

Before Brewster installed its current system, the company performed these applications manually with the help of an on-line service bureau.

Under the previous system, transactions were first recorded for invoicing and prebilled by an on-line terminal. One problem with that system was that a customer phoning in five or 10 orders a week would receive five to 10 separate invoices a week, one for each order.

As soon as an order was recorded, a shipping notice was then sent to the warehouse by pneumatic tube to allow warehouse personnel to begin assembling, packaging and shipping the order to its customer.

Records of such transactions had several other important uses. They became part of the customer's statement, of the company's overall accounts receivable report and of the company's sales report.

With Brewster's rapid growth during the last five years, accurate, up-to-date reports for both inventory control and accounts receivable became difficult to maintain, especially with more than 10,000 items in inventory and more than 2,000 active customers, many of whom were dealt with daily.

When Brewster realized its continuing expansion would eventually necessitate

(Continued on Page 50)

Four Firms Get Top Marks in User Poll

DELRAN, N.J. — Basic/Four Corp., Digital Scientific Corp., IBM and Prime Computer, Inc. have achieved a higher level of overall customer satisfaction than any other vendors in the minicomputer sector, according to Datapro Research Corp.'s most recent survey of mini and small business systems users.

On a scale of one to four — with four representing the highest score and one the lowest — users gave the Digital Scientific small systems line an overall performance rating of 3.4 and the Basic/Four, IBM and Prime families a score of 3.3.

A few vendors like Digital Equipment Corp. and Data General Corp. earned even higher marks for individual offerings like the Datasystem 500 series and the Eclipse C/330. But no minicomputer firms elicited as consistently high a level of user satisfaction throughout an entire product line as Basic/Four, Digital Scientific, IBM and Prime, the survey results indicated.

Datapro traced its findings to a 1977 survey in which the firm asked an estimated 10,000 minicomputer users to rate their systems according to 12 key criteria: ease of operation, mainframe reliability, peripherals reliability, responsiveness of maintenance, effectiveness of maintenance, technical support, operating system, compilers and assemblers, applications programs, ease of programming, ease of conversion and overall satisfaction.

More than 800 users — representing 30 vendors and more than 60 system models — responded to the survey and, following Datapro's instructions, used a rating of four to denote "excellent" performance, three for "good," two for "fair" and one for "poor."

For each category, Datapro then added the users' ratings and divided the total by the number of respondents to obtain an average performance evaluation.

As a whole, the respondents voiced a reasonable level of satisfaction with their small systems hardware, software and maintenance. Overall satisfaction among the users averaged 3.1, while ease of use and mainframe reliability, each with a 3.4 average score, garnered the highest user ratings of the 12 performance categories.

Only in two areas — technical support and applications programs, where ratings

(Continued on Page 52)

DEC Adds Smaller Version Of Packaged Micro System

By Jeffry Beeler
CW Staff

MAYNARD, Mass. — Digital Equipment Corp.'s L System line of packaged microcomputer systems recently gained a second model when the company announced a small version of the family's original member — the PDP-11T03-L, which was introduced late last May.

Designated the PDP-11V03-L, the latest L system member incorporates a PDP-11/03-L microcomputer with up to 32K bytes of MOS memory that users can supplement with up to 32K bytes of optional read-only or ultra-violet programmable read-only memory, according to a DEC spokesman. The system also incorporates one of the minicomputer manufacturer's recently announced RX02 dual-density floppy diskette units, which accommodates a maximum of 1.2M bytes.

The PDP-11T03-L, by contrast, expands to as much as 64K bytes of MOS memory and supports an RL01 dual-disk subsystem that holds 5.2M bytes per disk, the spokesman noted.

In processing power, however, the two L System models are almost identical because they use the same processor and extended Fortran instruction set.

Although DEC intends its latest packaged system primarily for OEMs, the product also suits end users that plan to do most or

(Continued on Page 52)

DEC's PDP-11V03-L

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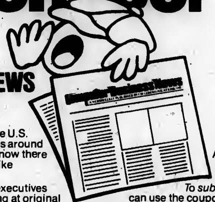

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Computer Business News

Small Multiuser System Saves Broker $20,000/Year

By Marcy Rosenberg
CW Staff

MINNEAPOLIS — By adding a multiuser small business system to automate accounting procedures, a reduced commissions brokerage firm "saved between $20,000 and $50,000 a year in what could have been service bureau or increased labor costs," according to Joe Krammer, president of Thrift Trading.

Krammer's firm uses a Wang Laboratories, Inc. 2200 MVP multiuser small business system with four CRT terminals, each performing two functions at the same time, Krammer said.

With a multiuser system, he noted, "I can have one terminal processing orders, another listing out various debits and credits and a third doing transfer forms or checks."

Thrift Trading first automated its manual bookkeeping method a little more than a year ago when it purchased a 16K-byte Wang 2200VP processor, a Model 2226 inquiry terminal, a 10M-byte fixed/removable disk and a printer. Wang developed a turnkey Basic software package for the brokerage firm.

"We needed a software package that would allow us to make and store in the computer the 44 bookkeeping entries it usually takes to complete one transaction and then call up the information visually or in print as needed," Krammer noted.

Thrift Trading evaluated an IBM System/32 and a Lockheed Electronics Co. System III, among others, before selecting the Wang 2200VP. "The IBM prices were unreal," Krammer said, "and Lockheed didn't offer service.

"We selected the Wang system for its interactive terminals, strong Basic language and upgrade capabilities."

How easily the system could be upgraded was put to the test less than six months after it was installed when the brokerage firm decided it needed more memory and the ability to do more independent processing. To convert the system to a multiuser Wang 2200 MVP, the firm only had to modify its programs so they could be shared by more than one terminal and to train an operator in system generation.

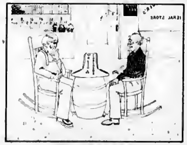
Thrift Trading's multiuser system consists of a 64K-byte 2200MVP, one 2260B 10M-byte fixed/removable disk, a 2770 A-D triple flexible disk drive unit, four 2236D inquiry terminals, one 2221W printer at the system console and two 2281 daisywheel printers for output at the terminals.

Representing a hardware investment of almost $70,000, the 2200MVP costs the firm "just slightly more than one year's rental time at a service bureau," Krammer estimated. A service bureau usually charges for program changes and doubles its charges if the customer's volume of entries doubles, he explained.

Without its own computer for bookkeeping, Krammer's nine-employee firm "would have needed to add at least two more staff members at a cost of a couple of thousand dollars a month," he said.

The brokerage firm plans to expand its business by opening a second office in St. Paul in mid-November and possibly a third in Rochester, Minn., in December.

"We are able to add offices largely because of the computer," he said. "We couldn't have handled the increased amount of bookkeeping manually."



'Your Move, Zeb.'

PDP-11s Get Disk Controller

PALO ALTO, Calif. — A single-board disk controller for the Digital Equipment Corp. PDP-11 series cuts the cost of disk control by at least half, according to a spokesman for Minicomputer Technology, Inc., the product's developer.

Designated the SMC11, the controller links any PDP-11 to disk units from Ampex Corp., California Computer Products, Inc., Control Data Corp., Kennedy Co., Memorex Corp., Microdata Corp. and Okidata Corp. The controller also reportedly supports one or two disk units in most capacity combinations.

In addition to costing $3,500 to $8,500 less than comparable multiboard configurations, the unit saves board space by eliminating extra fans, power supplies, multiboard interconnections and cabinetry, the source said.

With one command, the SMC11 can transfer multiple sectors consisting of up to 64K words, the spokesman added. Among its other features, the controller provides hardware error correction and sector flagging during formatting and allows two CPUs to share one or more disk systems.

With flat cabling to the first disk unit, reference manual and limited one-year warranty on parts and labor, the controller costs $3,580 with OEM discounts available from the company at 2470 Embarcadero Way, Palo Alto, Calif. 94303.

Step #2: Defining the problem

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Mini Helps Unclog User's Paperwork Jam

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an alternative DP system, it established several goals for this system:

- Because it would have to meet current as well as future needs, the system would have to be expandable and flexible.
- With increased volume raising its administrative costs, Brewster needed to cut the amount of recordkeeping, file maintenance and paperwork then required for its business.
- To keep pace in an increasingly competitive market, Brewster wanted to offer its customers the best service, while at the same time making such vital information as inventory control reports accessible at less cost, with greater accuracy and with a faster turnaround time.
- Brewster wanted to obtain all of the elements for this new system from one supplier so that its personnel would not have to be the intermediaries between a supplier of hardware and a provider of software.

After investigating many DP systems, Brewster decided to purchase the Microdata Corp. Reality system from Northeast Data Systems, Inc. Working with Northeast Data's personnel, Brewster stipulated its needs so that the system would be designed with all the appropriate software options to give the company the type of report flexibility it needed.

Brewster liked the idea that Northeast Data would be supplying all the system's elements including design, hardware, programming, maintenance, training and conversion assistance.

When the system was installed last May, Brewster ran it in parallel with the earlier system for two months to make sure there would be no slippage of information retrieval or of service. Then in July, the Reality system took over total operation on its own.

Present Configuration

As the system is now constituted, two of its CRT terminals are located in the main sales office and the other two in the computer room, while two of the printers also operate in the computer room and one in the warehouse.

With the system, an incoming order is immediately entered into the computer through one of the CRT terminals in the sales order department. Northeast Data designed the system so that, once entered, all the information about the transaction is available to the computer so it can handle any other business relating to that order.

Northeast Data also placed terminals at strategic locations. Now when an order is entered in the sales office, a printer in the warehouse automatically prints a shipping order at 120 char./sec.

Thus, the warehouse is informed as soon as the order is entered and begins shipping procedures.

Northeast Data also addressed Brewster's need to decrease paperwork. Now, because all the week's transactions are part of the computer's stored memory, all billing can be done automatically by the computer at week's end. With an instruction from Brewster's personnel, the computer prints bills in the computer room at 300 line/min.

In addition to giving Brewster's customers a clear and current statement of their accounts, the system provides the latest mailing and sorting techniques. With its software options, Brewster can sort its active mailing list of customers by sales territory, by Zip Code or by any other key variable.

The system also updates inventory records and gives Brewster reports on exactly what it has in stock at any time. Moreover, it provides stock status reports, sales reports, credit reports and planning-oriented cost projections.

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PDP-11/34 Gets Memory

MAYNARD, Mass. — In noncache configurations, an addition to the PDP-11/34 MOS memory line reportedly provides up to 20% greater performance than existing MOS memories for the Digital Equipment Corp. minicomputer. In cache configurations, the MS11 memory offers as much as 10% more performance.

The memory also stores up to 256K bytes on one board and uses 50% to 70% of the power required by older PDP-11/34 memories, according to a DEC spokesman.

In single quantities, the MS11 costs $4,500 and is from DEC at 146 Main St., Maynard, Mass. 01754.

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Four Cartridges Handled

CANTON, Mass. — Up to four 10M-byte disk cartridge units from Data General Corp., Pertec Computer Corp. or Diablo Systems, Inc. can reportedly be accommodated by a disk cartridge controller manufactured by Gen/Comp, Inc.

The Model 3052 also supports 315K-byte diskette units or up to four 2.5M-byte disk cartridge systems from those three suppliers.

Packaged on one 15-in. by 15-in. board, the controller is said to be media-compatible with DG, Pertec, Diablo and comparable disk drive units. The unit is also pin-compatible with the DG 4234, 6045 and 6030.

The disk cartridge controller costs $2,350, excluding an extra $150 charge for a 10-ft cable from a CPU to the first disk unit. Gen/Comp is located at 6 Algonquin Road, Canton, Mass. 02021.

Gen/Comp, Inc.'s Model 3052

Double-Height Board Has Quad-Height Unit Features

SANTA CLARA, Calif. — Features said to be usually associated only with quad-height memory boards are reportedly available with a double-height memory from National Semiconductor Corp.'s Computer Products Division.

Plug-compatible with the Digital Equipment Corp. LSI-11, LSI-11/2 and PDP-11/03, the NS11/2P memory board provides on-board parity generation and parity check circuits, external or internal refresh functions, battery backup and address-space expansion, according to a National Semi spokesman.

The NMOS random-access memory is typically configured as 32K by 18 bits and stores 128K words on one 5.187-in. by 8.43-in. by .5-in. card. To increase working storage, users can expand the memory by 28K-, 30K-, 31K- or 31.5K words by using on-board DIP switches to enable the top memory section, which is usually reserved for I/O device addresses.

NS11/2P operates with or in place of DEC's MMV11-D and -E or MSV11-D and -E series modules in the H9281, H9270 or DDV11-B backplanes. Users require no special tools or adjustments to install the unit, the firm said.

Some of the memory's operating specifications include a 250-nsec read-access, 500-nsec read-cycle, 130-nsec write per word or byte, 545-nsec write cycle and 250-nsec/byte read-modify-write (RMW) access with a 1,115-nsec RMW cycle.

Although a standard NS11/2P is configured as 32K by 18 bits, the product also comes in 32K by 16-bit versions without parity and depopulated 16K by 18-bit or 16K by 16-bit configurations, the spokesman noted.

A 16K-bit NS11/2P costs $965, compared with $1,565 for a 32K-bit configuration. National Semiconductor's Computer Products Group is located at 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

Floppy Disk System Stores 2.5M Bytes

MOUNTAIN VIEW, Calif. — Users can reportedly transfer 19.2k bit/sec and more to their minicomputers with a floppy disk storage system from SMS, Inc.

A spokesman for the disk controller and storage systems manufacturer credited the FT227D's data transfer rate with eliminating the transmission delays often associated with RS-232 interface-equipped floppy systems.

The SMS system stores up to 2.5M bytes on single- or double-sided IBM-compatible diskettes and permits either IBM 3740 single- or double-density recording.

A 2.5M-byte version of the product costs $4,100 from SMS at 777 E. Middlefield Road, Mountain View, Calif. 94043.

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Four Vendors in Near-Tie In Datapro Survey of Users

(Continued from Page 47)

averaged 2.6 and 2.7, respectively — did users report significant shortcomings in small business systems performance.

Among the small computer vendors, Hewlett-Packard Co., Microdata Corp., Univac and Wang Laboratories, Inc. received the highest overall user satisfaction ratings behind Basic/Four, Digital Scientific, IBM and Prime. All four second-place finishers averaged a 3.2 score for their entire small systems lines, Datapro reported.

DEC, Four-Phase Systems, Inc., Datapoint Corp. and Interdata tied for the third highest ratings, with an average mark of 3.1, while Burroughs Corp., Cincinnati Milacron, Inc. and NCR Corp. each earned a 3.0 for their overall systems performance.

Other vendors rated during the survey included DG and Honeywell, Inc., which scored 2.8 and 2.9, respectively.

Lowest Marks

Some of the survey's lowest overall marks went to Texas Instruments, Inc. with 2.6, Modular Computer Systems, Inc. (Modcomp) with 2.4 and Raytheon Data Systems Co. with 2.0.

Among individual systems, the DEC Datasystem 500 series topped the list in user satisfaction with an overall rating of 3.7 for the 12 performance categories. DG's Eclipse C/330 followed closely in second place with a 3.5 average mark, as did the Datasystem 3000 series, HP 300 series, IBM System/3 Model 8 and 360/20, Jacquard Systems, Inc. J100 and Univac (formerly Varian) 620.

Users gave the Burroughs L series, Honeywell Level 62 family and IBM System/3 models 6 and 12 an overall satisfaction rating of 3.4, while the IBM System 32, Univac 90/30 and Interdata Model 70 averaged 3.3, Datapro found. Systems rated at 3.2 included the Datapoint 1100, PDP-11/40 through -/70 models, Microdata Reality series, NCR Century 101 and Wang 2200 series.

Elsewhere in the survey, the Burroughs B 1700 series received an overall score of 3.0; the DG Nova series, 3.0; the DEC PDP-8 series, 2.8; and the NCR 8200/8250 systems, 3.0.

Differing Responses

When Datapro focused individually on each of the other 11 performance criteria, the firm often noted widely differing user responses to the same system. Some offerings apparently excelled in certain performance areas and faltered somewhat in others.

In mainframe reliability, for example, the highest user praise went to the IBM 5100, Systems Engineering Labs, Inc. small computer line and the Univac 620, all of which earned an "excellent" rating. Honeywell's Level 6 processor, with a 3.8, also ranked among the most reliable CPUs.

Processors that achieved a 3.7 rating included the Datasystems 300 and 500, HP 3000 and DG Nova 3.

In effectiveness of maintenance, IBM's 360/20 and Univac's 620 led the field with a 4.0, compared with a surveywide average of 3.0. On the other hand, the Nova 2 and 2/10, PDP-8 series and Wang 2200 series each scored .4 points lower than the average for effectiveness of maintenance.

The results of Datapro's user survey appear in a recently updated version of its feature report *All About Small Business Computers*. In addition to summarizing user evaluations of minicomputer products and services, the 70-page report includes comparison charts for 289 systems from 84 vendors.

Priced at $12, the study is available from Datapro at 1805 Underwood Blvd., Delran, N.J. 08075.

DEC Adds Smaller Version Of Its PDP-11T03-L Micro

(Continued from Page 47)

all of their own software development, the source added. The system will typically perform standard business functions rather than laboratory or scientific applications.

The PDP-11V03 can simultaneously meet the needs of both OEMs and end users because the systems package includes DEC's basic software, the spokesman explained. Standard software includes the Version 3-B of DEC's RT-11 operating system as well as an editor, macro assembler and utilities.

Applications Programming Aids

Compared with earlier forms of RT-11, Version 3-B provides a simplified command language plus programming aids that together are said to ease development of application programs.

As options, DEC's latest L System member also offers high-level languages like Basic, Fortran IV and APL. With Fortran IV or macro assembler-developed programs, the system's extended floating-point instruction set speeds arithmetic operations by as much as threefold, he said.

Like most other packaged systems, the PDP-11V03-L comes primarily as a fixed configuration that leaves little room for alteration or expansion. Users do have a choice, however, of what terminals they wish to add to the system, the spokesman explained. Either DEC's LA36 Decwriter II printer terminal or its recently introduced VT100 CRT terminal will operate in the configuration.

As a package, the PDP-11V03-L's hardware modules cost 30% less than they would if acquired separately, the source added.

Housed in a 31-in.-tall cabinet, the system provides a built-in cooling system that reportedly permits it to operate in a typical business office without the environmental controls often associated with computer hardware.

A minimum PDP-11V03-L configuration with a 32K-byte main memory costs $10,500, compared with $18,000 for a 64K-byte system. Quantity discounts are available, and shipments will start this fall from DEC at 146 Main St., Maynard, Mass. 01754.

Self-Paced Instruction

Non-DPers Flocking to Micro Courses

By Ann Dooley
CW Staff

BERKELEY, Calif. — In an area described as a "hotbed" of microcomputer activity, interested students are flocking to a series of special courses designed to familiarize laypeople with small business systems.

The courses are being held at the Small Business Computer Center at the Peralta College for Non-Traditional Study, where Center Director Richard Bidleman admitted he never expected such an onslaught of students. "I was expecting a maximum of 100 students, but instead more than 130 signed up in the first week of the program and enrollment is now at about 200 students," he said.

The open format program, which began in September, is still attracting five to six more students a week. The reason for its popularity may be that a lot of people hear about microcomputers, but have no way of learning about them at traditional adult education facilities, Bidleman said. Peralta College is one of several "colleges without walls" located around the country.

Bidleman, who spent more than three years developing the course material, noted that many of his students are people interested in learning more about a growing trend; some are even scientists interested in using small computers in their experiments.

The largest number of students are businesspeople whose companies are using a system or about to convert to one. These people come from a wide spectrum of businesses, from insurance to construction to travel. They themselves may not be using a computer, but they are interested, nevertheless.

At least half of the students are potential purchasers of small systems, Bidleman said. Ten or 12 people already own a small computer and as many as 30 are on the verge of purchasing one.

"I tell them not to buy one immediately until they learn more about them. It's not prac-

(Continued on Page 54)

Tina Joins Adam

SUNNYVALE, Calif. — Logical Machine Corp., manufacturer of the small business computer Adam, has now introduced Tina, a desktop computer that, like Adam, utilizes the English language to help the user control the system himself and avoid prepackaged software.

Tina is packaged in three modules:

- The CRT and its detachable keyboard house the MPU and memory circuits.
- A separate medium-speed printer is standard; high-speed printer is optional.
- A dual floppy disk drive contains one disk assigned to retain the vocabulary taught to Tina by the user; the other stores the information in the files needed by the user.

The floppy disks hold 1.25M bytes of information. The file disk can be changed in the middle of a job to enhance storage capacity, the firm noted.

Tina costs $14,995 from Logical Machine Corp., 1294 Hammerwood Ave., Sunnyvale, Calif. 94086.

Floppy/CRT Controller Board Among Three From DOSC

NEW YORK — DOSC, Inc. has introduced a high-resolution graphics board, an OEM single-board computer containing both a floppy and CRT controller and an MPU board for industrial control applications.

The SVB-80 graphics board is compatible with the Intel Corp. Multibus and offers high-resolution graphics, including multi-language character generation, according to a spokesman. It is capable of generating and displaying any character set and can intermix characters and graphics, he said.

The board features 32K of random-access memory (RAM) and a character display with programmable options of 80 characters by 40 lines or 72 characters by 44 lines. In applications where lower resolution graphics are adequate, 16K of the board's memory can be utilized as standard RAM and 16K for the display. The SVB-80 costs $895.

The TCB-85, the single-board microcomputer with resident floppy and CRT controllers, offers a CRT monitor, floppy disk, keyboard and printer. Other features include support for 16K programmable read-only memory (Prom), vectored interrupts, 48K RAM and serial I/O ports.

The board can support CP/M, a disk operating system, Basic, Cobol, Fortran, a text editor and assembler; it is priced at $1,495 per unit in quantities of 10.

The third device, the MIB-85 microprocessor board, features Prom storage and RAM storage capacity. The MIB-85 uses an Intel 8085 MPU.

The board features support for 16K or 32K Prom, programmable interrupt controller with eight interrupt levels, up to 8K of RAM and a programmable keyboard interface. It costs $325.

DOSC is at 500 Fifth Ave., New York, N.Y. 10036.

S-100 Compatibles Get Disk

IRVINE, Calif. — An S-100 bus-compatible 10M-byte disk system has been introduced by Alpha Micro.

The Model AM-500 consists of a single-board controller, interconnect cable and disk drive. The disk drive is the 10M-byte Control Data Corp. Hawk, which utilizes a 5M-byte fixed disk and 5M-byte removable cartridge.

The controller is interrupt-driven, requires a simple interface to the CPU operating system and performs complete 512-byte transfers, Alpha Micro said.

Although the AM-500 was designed to work with the Amos operating system, it can be purchased as a stand-alone and used with other operating systems on the S-100 bus, a spokesman noted.

Available in a rack-mounted version or in a stand-alone cabinet, the AM-500 costs $7,995. Alpha Micro is at 17881 Sky Park North, Irvine, Calif. 92714.

Alpha Micro AM-500

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Programs on Cassettes

MORRISTOWN, N.J. — Creative Computing has released more than 120 programs on 21 cassettes and two floppy disks that offer logic games, number games, educational simulations, drill and practice exercises, word games and graphics.

Many of the programs are drawn from the book, *Basic Computer Games*, its sequel, *More Basic Computer Games*, and *Creative Computing* magazine.

Each cassette contains an average of six programs; the two floppy disks each contain 50 programs.

Individual cassettes cost $7.95 and the floppy disks are $17.95 each from computer stores or from Creative Computing, P.O. Box 789-M, Morristown, N.J. 07960.

Micro Courses Prove Popular

(Continued from 53)

tical to buy a car until you learn how to drive and people should feel the same way about microcomputers," he said.

The function of the learning center is not to sell any particular microcomputer, but rather to give a student knowledge about micros in general. The goals of the course are to enable the student to determine his specific computer needs and applications, discover what hardware best meets those needs and learn either how to define his needs to a professional or program the micro himself.

Learning Center

Bidleman defined a small computer as any system that sells for less than $5,000 and includes a maximum of 48K memory and a hard-copy printer. The learning center uses three Radio Shack TRS 80s, each with a 32K-byte memory and a disk operating system.

The center will be getting three more systems within the next month to meet the needs of the increasing enrollment. The entire program consists of 60 hours of instruction and is divided into three mini courses, any of which can be taken by the student, depending on his level of skill or interest.

The modules within the course are self-paced. Bidleman or three assistants are present during learning hours in case a student needs special help or has questions.

The Center is open from 8 a.m. to 9 p.m. most days; weekend hours will probably be expanded to meet the overflow, Bidleman said.

The only rule laid down in the program is that a student should do at least two modules a week, but not more than three at one time. After that it is up to the individual.

'Retail Store of Education'

"I consider the learning center to be a retail store of education," according to Bidleman, who said he is prepared to serve a student whenever he comes through the door — but is also prepared to let him "browse" by himself. Students can come in whenever they like and are limited only by the extent of the facilities.

Most of Bidleman's students are in their early 30s; only about one-quarter are women. Almost all seem to be excited about the program, and the only dropout has been a student who moved to China, Bidleman said.

One reason the program is such a success, he believes, is that the self-teaching method concentrates on mastery learning, not competitive learning, so it creates a nonthreatening environment. This method seems to work best with adults, however, since several high school students need significantly more help and guidance, he said.

The youngest student in the course is 18 years old and the oldest is a 70-year-old author who wants to design word processing systems.

Several handicapped students are also participating in the course. One deaf student learns by coordinating the course's audiovisual equipment with a printed copy of the instructions.

Several blind students use head sets over which audio instructions are conveyed. They also have helpers who read the printed material to them.

Independent Modules

The three modules which compose the course work are all stand-alone and independent of each other. After each unit of instruction, the student can take a self-test to determine his grasp of the material.

The "Computer Hardware and Concepts" module covers material such as batch processing, time-sharing, real-time processing, peripherals and the differences between tapes and disks.

Participants in the "Programming Computers" module are expected to write a simple program in Basic upon completion of the course. The module entails determining the solution to a problem and designing output and the corresponding input, flowcharting, testing and debugging.

The third module, which covers how microcomputers are used, explores file processing and the use of master, activity and sorting files. It encourages users to project how computers can be applied to their own work.

The course is free to California residents; students pay only for course materials and lab fees. Bidleman, who expects to have as many as 300 students by the end of the year, noted that the instructional package is available through Media Systems Corp., a division of Harcourt Brace & Jovanovich, Inc. of New York.

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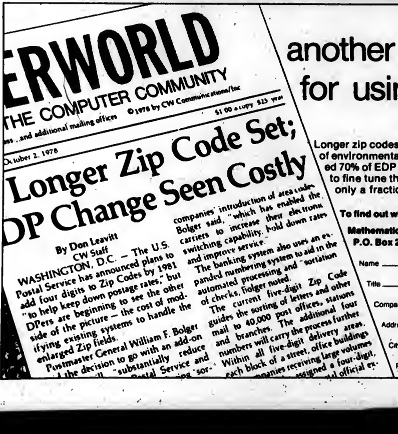

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Longer Zip Code Set;
DP Change Seen Costly

By Don Leavitt
CW Staff

WASHINGTON, D.C. — The U.S. Postal Service has announced plans to add four digits to Zip Codes by 1981 "to help keep down postage rates," but DPers are beginning to see the other side of the picture — the cost of modifying existing systems to handle the enlarged Zip fields.

Postmaster General William F. Bolger ... the decision to go with an add-on ... "substantially reduce ... Postal Service and ... sor-

companies' introduction of area codes Bolger said, "which has enabled the carriers to increase their electronic switching capability, hold down rates and improve service."

The banking system also uses an expanded numbering system to aid in the automated processing and "sortation of checks, Bolger noted.

The current five-digit Zip Code guides the sorting of letters and other mail to 40,000 post offices, stations and branches. The additional four numbers will carry the process further. Within all five-digit delivery areas, each block of a street, office buildings ... companies receiving large volumes ... assigned a four-digit, ... official ex-

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Longer zip codes are just one more example of the kind of environmental maintenance that eats up an estimated 70% of EDP budgets. RAMIS II systems are so easy to fine tune that keeping up with such change takes only a fraction of the usual effort.

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Why APL?

By Robert E. Cook and Allen J. Rose

Interactive programming languages are on the move again, thanks to the business community's need and enthusiasm for an understandable computer language. The much trumpeted price/performance improvements in hardware, coupled with inflation-driven increases in personnel costs, are giving new life and growth to interactive programming languages.

The economic benefits of interactive computing are increasingly evident, effecting a bright future for this 17-year-old innovation. It yields significant gains in personnel productivity since results can be obtained quickly.

The improved economics that apply to increased programmer productivity using interactive computing also apply to increased programmer productivity using a language designed for interaction. Research shows APL (A Programming Language) gives a huge increase — 300% to 500% — in programming productivity at some price in run time efficiency. This efficiency "penalty" is becoming increasingly less expensive.

APL usage is increasing at a rapid rate because of its inherent productivity benefits. Hence, a review of the history of APL and its application to business analysis will interest many DP professionals.

Motivation for Notation

In the late 1950s, Kenneth Iverson, then an applied mathematician at Harvard University, had an academic interest in various algorithmic processes such as methods of arranging data into ascending order, new ways to calculate Eigenvectors and procedures (manual or computer) for running and managing order/shipping/billing systems.

One of Iverson's nagging problems was how to communicate his new ideas efficiently to others. The most obvious possibility was our native language, but experts in most technical disciplines know very well that even English (which seems better than most other languages for this purpose) can become cumbersome and confusing when used to describe detailed, abstract concepts.

Many systems designers have experienced this difficulty when writing specifications for a computer application that some other group will code. When we attempt to run the completed system, we find the finished product is far different from that which the original analyst thought was specified.

In order to assure total understanding, one must employ great detail — so much so that preliminary specifications are often much larger than the resulting program.

Because of the limitations of English, Iverson considered other means of communications. He was aware of the then-developing computer programming languages, but dismissed their use because none supported array (table) computations directly. Further, he felt that storage allocation statements (such as DIMENSION, DATA DIVISION and similar conventions) were roadblocks to exposition and comprehension in the people-to-people communication of information.

Iverson also recognized the inadequacies of conventional mathematical notation. For example, the symbol "x" has been used to mean ordinary scalar multiplication and matrix multiplication and to represent "and" for Boolean mathematics. The pi symbol means both 3.14159 and cumulative multiplication.

The traditional approach taken by authors to represent their ideas (when conventional notation runs out) is to fabricate their own extensions. The result of this practice is a virtual Tower of Babel in mathematics literature. Much effort is wasted in applied texts by explaining local notational conventions.

Iverson recognized that conventional mathematical notation was the best starting point to solve this problem. Since he was interested in a broad variety of quantitative problems, he set out to develop one notation covering them all.

This effort led to a comprehensive notation which Iverson felt was adequate for describing algorithmic processes, with no bias toward any particular application area.

Iverson's book, *A Programming Language* (Wiley, 1962), set forth the author's notation as an Esperanto for quantitative expression. In that same year Iverson joined IBM's Research Center in Yorktown Heights, N.Y. There, he and a few devotees conti-

(Continued on In Depth/2)

(Continued from In Depth/1)

nued to investigate the adequacy of his notation for solving a variety of problems.

These studies were called *formal descriptions;* an expert selected classical problems from his own field, such as fluid mechanics, computer architecture or accounting, and described these "textbook" problems in Iverson's notation. He then supplied data and manually worked through the steps to see if the results were as expected, if the statement of the problem was unambiguous and if the entire process was "comfortable."

The Implementation

To eliminate the hand calculation required, Iverson commissioned an implementation of his notation on a computer. In the fall of 1965, this implementation was completed and put into use.

It soon became apparent to many that the implementation had potential beyond the limited research environment for which it was originally designed. As part of selling IBM management on the merits of promoting Iversons computer-assisted notation, the group chose the acronym APL to describe it. Since IBM's language policy was firmly centered on Cobol, Fortran and PL/I at the time, the appeal to promote APL was unsuccessful.

Meanwhile, the availability of APL at the Yorktown Heights Research Center was attractive to the research staff. Many people within IBM learned APL and used it daily in their work. Word of this use spread throughout IBM by informal channels.

By 1974, APL had become the most widely used interactive system within IBM. Interestingly, most of this APL use was for commercial applications.

Led by this internal growth, APL began to leak out. Prior to unbundling, APL was available free to outside organizations. Universities explored it, and time-sharing companies seeking innovations began to offer it. Today APL is available on many modern computers, and more than 30 time-sharing companies provide APL service as well.

Reacting to this acceptance in the marketplace, IBM has gradually given APL an increasingly important official status. The current primary APL offering from IBM is VSAPL.

In spite of the fact that APL's origins are in research, its dominant use today is for commercial data processing. How could a system conceived by mathematicians, highly symbolic in nature and lacking official sanction become so popular? We can only suspect it is because of its merit and highly favorable experience by users.

If ubiquitous DP terms like DASD, JCL and Ebcdic can be briefly ignored, the goal of involvement with computing returns to consciousness. Most business people are concerned with the timely and accurate acquisition, retention, computation, retrieval and display of business information.

The APL language, along with a report formatter and an APL-oriented file system, can be used very effectively for business and financial analyses and computations.

APL Calculations

One of the major reasons why Iverson didn't base his Harvard work on existing computer programming languages was because they generally lacked built-in array (table) handling features. Mathematicians tend to use the term "matrix algebra" to describe this activity; business people view it as performing calculations on lists or tables of values, such as revenues and expense data for a number of time periods.

Examinations will show that table-oriented calculations comprise a surprisingly large part of business and financially oriented analyses. Examples in APL are shown in Figure 1. These lists (or vectors) can be displayed by simply typing their names, as in Figure 2.

Simple arithmetic operations can be performed on the data without having to resort to loops, structured programming or data base management (Figure 3). Accumulations can also be obtained very simply (Figure 4), and even running totals are "primitive" operations (Figure 5).

Thus cash flows can be obtained as shown in Figure 6. This operation reports on the number of data items in a list (Figure 7) and the average revenue is computed by the equation shown in

(Continued on In Depth/7)

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```
      REVENUES←10000 12500 25000
      EXPENSES← 5500  7125 15000
```

Figure 1

```
      REVENUES
10000 12500 25000
      EXPENSES
5500 7125 15000
```

Figure 2

```
      REVENUES-EXPENSES
4500 5375 10000
      REVENUES÷EXPENSES
1.818181818 1.754385965 1.666666667
      EXPENSES÷REVENUES
0.55 0.57 0.6
```

Figure 3

```
      +/REVENUES
47500
```

Figure 4

```
      +\REVENUES
10000 22500 47500
      +\EXPENSES
5500 12625 27625
```

Figure 5

```
      +\REVENUES-EXPENSES
4500 9875 19875
```

Figure 6

```
      ⍴REVENUES
3
```

Figure 7

```
      (+/REVENUES)÷⍴REVENUES
15833.33333
```

Figure 8

```
      TABLE←2 3⍴REVENUES, EXPENSES
```

Figure 9

```
      TABLE
10000 12500 25000
 5500  7125 15000
```

Figure 10

```
      TABLE←TABLE,[2]+/[2]TABLE
      TABLE
10000 12500 25000 47500
 5500  7125 15000 27625
```

Figure 11

```
      +/[1]TABLE
15500 19625 40000 75125
      -/[1]TABLE
4500 5375 10000 19875
```

Figure 12

```
      TABLE←TABLE,[1]-/[1]TABLE
      TABLE
10000 12500 25000 47500
 5500  7125 15000 27625
 4500  5375 10000 19875
```

Figure 13

```
      TABLE←TABLE,[1].48×TABLE[3;]
      TABLE

10000          12500          25000          47500
 5500           7125          15000          27625
 4500           5375          10000          19875
 2160           2580           4800           9540
```

Figure 14

```
      TABLE←TABLE,[1]-/[1]TABLE[3 4;]
      TABLE
10000          12500          25000          47500
 5500           7125          15000          27625
 4500           5375          10000          19875
 2160           2580           4800           9540
 2340           2795           5200          10335
```

Figure 15

(Continued from In Depth/2)

Figure 8.

Our revenues and expenses figures can be put together into a two-dimensional table (Figure 9). Here we catenated (,) revenues and expenses together (a list with six items), then reshaped (⍴) those six items into a table with two rows and three columns (Figure 10).

For display purposes, it may be desirable to catenate a column of totals to the table, as shown in Figure 11. Here, we're stating over which dimension we should sum, since TABLE has more than one dimension. Naturally, Figure 12 also works.

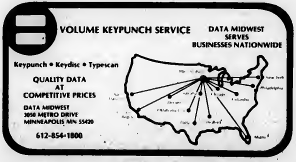
We can catenate the gross profits as another row of TABLE as shown in Figure 13. Calculating taxes as .48 of gross profits and catenating another row is shown in Figure 14. Note that this display is mysteriously spread out. So far, we haven't been concerned with how APL displays its results — it obtained the right answers, but not necessarily in the desired format.

Before we address that, let's complete the table to include net profits (Figure 15. The data is now computed for a simple corporate operating statement, but most managers would not accept these results without annotation such as title, names for the various rows and columns and other formatting features.

Formatting Features

When APL was implemented on a computer, the language did not have commercial report-formatting features

(Continued on In Depth/8)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```
          '3I8,I12' ⎕FMT·(TABLE)
     10000   12500   25000       47500
      5500    7125   15000       27625
      4500    5375   10000       19875
      2160    2580    4800        9540
      2340    2795    5200       10335
```

Figure 16

```
         '3CI8,CP<$>F13.2' ⎕FMT (TABLE)
    10,000  12,500  25,000   $47,500.00
     5,500   7,125  15,000   $27,625.00
     4,500   5,375  10,000   $19,875.00
     2,160   2,580   4,800    $9,540.00
     2,340   2,795   5,200   $10,335.00
```

Figure 17

```
         'G<PHONE (999) 999-9999>'
         ⎕FMT (9144286910 3016578220)

    PHONE (914) 428-6910
    PHONE (301) 657-8220
```

Figure 18

```
 XX←¯98765 0.12 0 123.45 1234567890
 'CBR<       NONE >M<(>N<)>Q< >F15.2' ⎕FMT (XX)

     (98;765.00)
           0.12
           NONE
         123.45
***************
```

Figure 19

(Continued from In Depth/7)

— we lived with what APL chose to print or went through mental contortions to bend the data into acceptable form. APL's utility for commercial applications would have been diminished had its developers ignored this important aspect of computing.

A variety of formatting "primitives" have been developed for APL. One of the more popular schemes was developed by Scientific Time Sharing Corp. (STSC) and has Fortran's flavor. To format the integer table in Figure 15 into three columns eight characters wide and one column 12 characters wide, STSC's formatter works as shown in Figure 16.

But even here APL implementors have provided features desirable in commercial reporting, such as floating currency symbols (Figure 17). Of course, the popular picture phrase is provided also (Figure 18).

Figure 19 formats a list of values in a field 15 wide, with commas every third position, two trailing decimal digits and negative numbers in parentheses. It prints NONE wherever the data value is zero. The stars in the last row indicate the number was too long to fit in the field provided.

Formatting numeric results is only part of the job in report preparation. Another significant aspect is surrounding the data with meaningful titles and annotation. The fundamentals of character handling in APL are quite simple, as Figure 20 demonstrates.

That statement finds the occurrence of the first blank in the list of characters. A command like the one in Figure 21 drops the first 10 characters and leaves the rest to print.

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```
        TITLE←'OPERATING STATEMENT'
        ρTITLE
19
        TITLEι' '
10
```

Figure 20

```
              10↓TITLE
     STATEMENT
```

Figure 21

```
    ∇ REV REPORT EXP
[1]   ⍝ LEFT ARG IS REVENUES, RIGHT IS EXPENSES.  AJROSE 2 APR 77
[2]    ARRAY←(2,ρREV)ρREV,EXP ⍝ MAKE TABLE
[3]    ARRAY←ARRAY,[2]+/[2] ARRAY ⍝ SUM ACROSS AND CATENATE
[4]    ARRAY←ARRAY,[1]-/[1] ARRAY ⍝ ROW 3: GROSS PROFIT
[5]    ARRAY←ARRAY,[1] 0.48×ARRAY[3;] ⍝ ROW 4: TAXES
[6]    ARRAY←ARRAY,[1]-/[1] ARRAY[3 4 ;] ⍝ ROW 5: NET
[7]    LINES←10 ROWNAMES '/REVENUES/EXPENSES/GROSS/TAXES/NET'
[8]    FORMAT←'10A1,3(CI8,X3),R<$>CI10'
[9]    FORMAT CENTER 'OPERATING STATEMENT'
[10]   ''
[11]   FORMAT COLNAMES '/LINE ITEM/DIV. A/DIV. B/DIV. C/TOTAL'
[12]   ''
[13]   FORMAT ⎕FMT (LINES;ARRAY)
    ∇

          10000 12500 25000 REPORT 5500 7125 15000
                    OPERATING STATEMENT

   LINE ITEM   DIV. A     DIV. B     DIV. C        TOTAL

   REVENUES    10,000     12,500     25,000      $47,500
   EXPENSES     5,500      7,125     15,000      $27,625
   GROSS        4,500      5,375     10,000      $19,875
   TAXES        2,160      2,580      4,800       $9,540
   NET          2,340      2,795      5,200      $10,335
```

Figure 22

Now we have a program that accepts a list of revenues and a list of expenses, and prepares a completed report. CENTER, ROWNAMES and COLNAMES are prepared programs which make titling easier (Figure 22).

Voluminous Data

A frustrating "feature" of early APL implementations was the inability to access more than a handful of data. This was partly because implementation was originally intended to serve modest scientific needs and partly because APL was implemented with a swapping scheme that didn't mix well with a virtual machine architecture. As with formatting, user needs dictated that in order to survive, APL had to be able to handle more data than the roughly 32K bytes provided in the original version.

The problem of dealing with large amounts of data in APL can be approached in four different ways. The first is to ignore the problem. This simply does not work.

While there are facilities for copying data from one "workspace" to another, these are purposely implemented to require manual intervention to prevent overloading the swapping mechanism of the system.

The second approach, adopted in some APL installations, is to modify the system to allow COPY commands to be executed under program control. The commands are typically stored as character arrays and executed by tricking the system to think they are keyboard inputs.

Because APL was originally implemented assuming infrequent, manual use of the facility, processing bogged down with even moderate use of the automated variant.

The third approach — also a popular one — is to employ the virtual memory by simply increasing the workspace size to a few million bytes. From an APL purist's vantage point, this is an elegant approach — no additional language features have to be conjured up.

Virtual storage is not free, however; in the case of APL, its acceptance is its own undoing. Imagine performing some array operation on two large arrays that just happen to reside in different pages. The system must page for nearly every operation.

A clever virtual operating system would compensate for that by keeping the relevant pages in main memory. If you have 10 or 50 or 100 APL users connected, all doing large array operations simultaneously, the available main storage will be exhausted.

Further, this simplistic approach of using virtual storage does not address the need to share data among users. In effect, it precludes the possibility of doing real-time processing employing shared data bases.

IBM's more recent APL offerings, APLSV and VSAPL, provide an elegant interface mechanism called "shared variables." Through this interface, the APL user can access data stored by other APL users as well as data stored by alien (non-APL) processors.

For example, one can get at OS data sets or embody any of the commercially available data base management systems in his APL code. This technique can be applied when APL applications are written to perform interactive information retrieval on data stored by the production systems.

The problems with selling this approach to APL people is that most of them are not DP professionals in the classic sense. They are reluctant to deal machine-dependent data representations. The typical APL user knows there is a difference between numeric data and character data, but packed-decimal, half-word integer, double-precision floating-point and bit storage are alien concepts. As we've seen in the previous examples, you don't need to know them to get the business results you need.

The fourth approach is to provide a file system harmonious with APL philosophy — that is, not concerning the user with internal representation but being more sparing of computer resources than faking the manual com-

(Continued on In Depth/10)

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WANG

(Continued from In Depth/9)

mands or resorting solely to virtual workspaces. This solution is used by many major APL time-sharing vendors and several computer manufacturers; it can also be implemented via the shared variable mechanism of today's IBM APL offerings.

Many of these APL file systems differ in external appearance and in certain features, but the general approach is the same for almost all.

Experience has shown changing from one version to another is not a major problem.

APL File Systems: An Example

Imagine being responsible for keeping the medical records of some 5,000 patients. When a patient comes in for a visit, a standard set of 13 tests is done, and all 13 test results are kept for future analysis and study.

Although the same tests are made for each patient at each visit, some patients may accumulate many more visits than others. Records are kept only for the most recent 100 visits of each patient.

A likely structure for holding this data (if it could fit in the workspace) would be a three-dimensional array of patients by visits and by test results. In the file we're going to make, the component or record numbering will correspond to the first dimension of this hypothetical three-dimensional array, and each component will consist of a given patient's data. Each component will be a matrix whose row dimension is the number of visits so far, and there will be 13 columns for the 13 test results.

First we have to create and name a file (Figure 23). The operation ☐FCREATE is used to create the file. The left argument is the name of the file and the right argument is the file tie number or the number that logically connects the user with the desired data file.

There is no permanent connection between a file name and a file tie number. A file can be tied to whatever number you choose in any session.

☐FSIZE helps the user determine physical attributes of a particular file. Its argument is an active file tie number. The result is a four-element vector holding (1) the lowest numbered component in the file, (2) the number of the next available component in the file, (3) the amount of space currently used in the file and (4) the total space available in the file (Figure 24).

The lowest component in our file is 1, but the next available component is also 1. This an indication that the file is empty, which is certainly what we'd expect for a file into which we have put nothing. The third element is zero, again indicating an empty file. The last element is 100864, which is the nominal byte capacity for this file.

Our file obviously doesn't have the capacity to hold all the data we intend for it. This space can be provided in two ways. If we had created the file in Figure 25, then it would have had the required capacity (computed from 4 bytes per integer to be stored, times 5000 patients, times 100 rows, times 13 columns), plus 4% overhead.

Alternatively, we could have used ☐FRESIZE (Figure 26). The right argument is the file tie number, and the left argument is the amount of space to be reserved for the file.

Let's now begin to store some data in the file. We'll use the variables P1 and P2 which contain data on-hand for two patients (Figure 27).

We are simulating Patient 1 with two visits and Patient 2 with one visit. In Figure 28, we put Patient 1 on the file, using ☐FAPPEND.

☐FAPPEND puts the value of its left argument as a new component at the end of the file designated in the right argument. The lowest component is still number 1, but the next available component is now number 2. The "diamond" character acts as a statement separator.

Continuing, we add Patient 2, as shown in Figure 29. Note that the space used (third element of the result of ☐FSIZE took a big jump after the first ☐FAPPEND, but didn't increase after the second. This is the result of internal trade-offs for storage and time efficiency.

When you make your first append, the system reserves 6,304 bytes of storage, keeps it handy and won't reserve any more until you've used it all up.

To read information from a file, ☐FREAD is used (Figure 30). This brings into the active workspace an

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```
'MEDICAL' ⎕FCREATE 76
```

Figure 23

```
      ⎕FSIZE 76
1 1 0 100864
```

Figure 24

```
'MEDICAL 28000000' ⎕FCREATE 76
```

Figure 25

```
28000000 ⎕FRESIZE 76
```

Figure 26

```
      P1
 3  5  5  6  1  2  4  6  3  2  1  4  2
 9  3 13  4  2  1  4  3  3  8  4  8 19
      P2
23  5  1  4  8  9 10 20  3  4  5 12  5
```

Figure 27

```
      P1 ⎕FAPPEND 76
      ⎕FSIZE 76
1 2 6304 28002368
```

Figure 28

```
      P2 ⎕FAPPEND 76 ◇ ⎕FSIZE 76
1 3 6304 28002368
```

Figure 29

```
P2←⎕FREAD 76 2 ◇ P1←⎕FREAD 76 1
```

Figure 30

```
    ∇ R←TOTVISITS N;COUNTER
      ⍝ N IS THE FILE TIE NUMBER
      R←0 ◇ COUNTER←(⎕FSIZE N)[1]-1
     LOOP:COUNTER←COUNTER+1 ◇ →0 IF COUNTER=(⎕FSIZE N)[2]
      R←R+1↑⍴⎕FREAD N,COUNTER ◇ →LOOP
    ∇
      TOTVISITS 76
3
```

Figure 31

```
    ∇ NEWPATIENT N
      ⍝ N IS THE FILE TIE NUMBER
      'THIS IS PATIENT ';(⎕FSIZE N)[2]
      (0 13⍴0) ⎕FAPPEND N
    ∇
```

Figure 32

```
    ∇ P NEWVISIT N;DATA
[1]   ⍝ P IS PATIENT NUMBER, N IS FILE TIE NUMBER.
[2]    →OK IF (P≥(⎕FSIZE N)[1])∧P<(⎕FSIZE N)[2]
[3]    'NO SUCH PATIENT NUMBER' ◇ →0
[4]   OK:'ENTER 13 VALUES'
[5]    →UPDATE IF 13=⍴DATA←,⎕
[6]    'INVALID INPUT: ';⍴DATA;' VALUES ENTERED' ◇ →0
[7]   UPDATE:DATA←(⎕FREAD N,P),[1] DATA ◇ DATA ⎕FREPLACE N,P
    ∇
```

Figure 33

```
(((-100⌊1↑⍴DATA),13)↑DATA) ⎕FREPLACE N,P
```

Figure 34

```
    ∇ R←V LASTVISIT N
      ⍝ V IS PATIENT NUMBER; N IS FILE TIE NUMBER
      R← 0 13 ⍴0
     LOOP:→0 IF 0=⍴V ◇ R←R,[1] ¯1 13↑⎕FREAD N,1↑V ◇ V←1↓V ◇ →LOOP
    ∇
```

Figure 35

```
    ∇ R←REL SELECT NCV;N;C;V;I
      ⍝ N IS 3-ELEMENT VECTOR: FILE TIE NUMBER, COLUMN, VALUE
      ⍝ REL IS LITERAL RELATION SYMBOL (<≤=≥> OR ≠)
      N←NCV[1] ◇ C←NCV[2] ◇ V←NCV[3]
      R←⍳0 ◇ I←(⎕FSIZE N)[1]-1
     LOOP:I←I+1 ◇ →0 IF I=(⎕FSIZE N)[2] ◇ COMP←(⎕FREAD N,I)[;C]
      R←R,(∨/⍎'V',REL,'COMP')/I ◇ →LOOP
    ∇

              '=' SELECT 76 4 6
        1
              '<' SELECT 76 12 19
        1 2
```

Figure 36

image of the file component. Although in this example we read the values back into the same variables from which they came, it is not necessary. For example, we could have entered P2⎕FREAD 76 1 and P1⎕FREAD 76 2, which would interchange the data for patients 1 and 2 in the workspace (but not in the file).

Figure 31 shows a simple function to find the total number of visits by all patients (that is, the total number of rows in the file).

Here are two more examples of programs that are obvious necessities: (1) establishing a new patient in the file by methods slightly more sophisticated than that done previously and (2) adding the results of a subsequent visit to any individual patient's data already in the file.

The first is handled by the defined function NEWPATIENT (Figure 32). This function simply appends an empty matrix for the new patient and prints the patient number that was assigned.

Figure 33 demonstrates a defined function for recording the data gathered on a patient's visit. The new file function, FREPLACE, on line 7, replaces the P-th file component with new data from the workspace. In our case, it's the catenation of what was in the component with another row, DATA, on the bottom.

Unique Relation

There doesn't have to be any relation between what is being replaced and what it is being replaced by, although in this example case there happened to be. The requirement that only the most recent 100 visits are to be kept in the file can be satisfied simply by changing the second statement on line 7 to read as in Figure 34.

Having written functions to enroll a new patient and enter the data from a visit, we now turn to programs for getting selected data from the file. Complete data on each patient can be obtained by reading his component. Figure 35 shows a function for obtaining a table consisting of the data from a set of patient's most recent visits. Figure 36 shows how more general search and retrieval tasks can be performed.

We could continue with this example, but the point has been made. The APL file consists of a sequence of records or components, each of which is an arbitrary APL data object.

There need be no preordained pattern of shapes, sizes or data types for the

(Continued on In Depth/12)

(Continued from In Depth/11)

file organization. Records can be replaced by larger records or by other data types. The user does not have to be concerned about the internal representation of data.

There are also functions to drop records from the low end or the high end of the file, thereby facilitating first in/first out (Fifo) and last in/first out (Lifo) architectures. Since the organization is arbitratry, the user can build keyed indexed systems easily by using fixed components (or even a second file) as the keys.

A Business Computation Notation

It is clear that APL has inherent merit in algorithmic expression. Augmented by a report formatting system and a file system, it satisfies the requirements of commercial data processing.

However, a controversy still lingers over symbolic notations (of which APL is an example) vs. English-like programming languages such as Cobol. The controversy centers around the trade-off between clumsy interactive programming structures, such as Cobol's DIVISION structure and unforgiving syntax analyzer, and APL's strange-looking notation.

Many DP professionals believe the demand for increased programmer productivity will combine with modern executives' demands for a clear, concise interactive programming language to create an explosive demand for APL. As more top business managers gain and use formal quantitative business skills, APL will move into the executive suite in a way that conventional languages cannot.

APL is a way to think and express oneself quantitatively, rather than another structured language to convert a series of calculation steps to machine-readable form. As a new means of thinking, APL will provide huge productivity increases throughout many organizations.

An interesting exercise is to solve the problems presented in this discussion with Fortran, Cobol or Basic, then compare the amount of code required with the APL solutions represented. You will find that the vast increase in code beyond that required for an APL solution illustrates the inherent "people productivity" of the APL language.

The increase in APL use, already experienced by firms such as IBM and Xerox, will soon spread to much of the rest of the business community. Why? Because as a tool for business and financial analysis and planning, APL simply has no peer.

Cook

Rose

Robert J. Cook is vice-president of planning at Scientific Time Sharing Corp., which he joined in 1977. He has been involved with APL since 1974.

Cook has extensive experience in the computer services industry. His previous positions include both technical and marketing positions at U.S. Timesharing and product line manager of time sales with Boeing Computer Services, Inc.

Cook graduated from Indiana University of Pennsylvania and holds an MBA from George Washington University.

Allen J. Rose is a founder of Scientific Time Sharing Corp. (STSC), where he is now vice-president and technical director.

Prior to his association with STSC, Rose was program administrator for APL in the Data Processing Division of IBM. From 1965 to 1968, as an IBM research staff member, he taught and promoted the use of APL.

Previously Rose was a statistician and computer consultant at Procter and Gamble's Development Center. He is a graduate of Duke University.

Rose is co-author of APL: An Interactive Approach, *an APL textbook. He was recently selected as a 1978–1979 Association for Computing Machinery national lecturer.*

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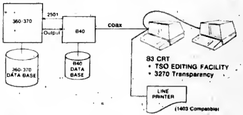

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Their Own 64K on the Way

IBM Chip Doesn't Worry Independents

By Marcia Blumenthal
CW Staff

IBM's recent announcement of its 8100 system incorporating a 64K-bit memory chip [CW, Oct. 9] has elicited a minimum degree of concern and surprise from independent chip makers.

The independents are not concerned because they do not compete directly with IBM and because IBM's chip does not exhibit a technological advance, they told *Computerworld* in a recent informal poll.

Most independents are gearing up to introduce a 64K chip in sample quantities no later than the first half of next year, the poll found. The first shipments are expected by the last half of 1979.

IBM is in the process of evaluating new technology, taking a wait-and-see attitude before deciding on whether to go with scaled MOS or VMOS technology, according to Jim Coe, director of marketing for digital products at Intersil, Inc.

Independents are not yet sure which technology will dominate — if any — and they don't have the luxury of investing in two separate technologies, Coe stressed. IBM could probably afford to invest in both technologies, he noted.

"It's been obvious that, in the past year, IBM has been playing catch-up with the industry," Coe remarked. However, IBM's technology is not as up-to-date as that of the independents, he contended, so it should not affect any independent makers.

The key thing to realize, Coe continued, is that IBM did not announce new technology. The IBM chip is probably fairly large and is a short-term solution until IBM can decide which of the technologies is the most feasible for use in its systems.

In the next few years, Coe said, IBM will probably do more business with independents because it will have problems keeping up with the demand for its products. Furthermore, by buying from outside suppliers, IBM will acquire the technology to compete with independent add-on memory makers, he added.

Intersil is going the way of scaled MOS technology. Coe expects a slew of announcements of 64K chips by next spring, but he said it will be late 1979 before chips with new technology are delivered.

Surprised at Gates

Mostek Corp. expects to have sample quantities of its 64K chip ready by the first quarter of next year and shipped during the second half of the year.

Gordon Hoffman, manager of Mostek's Memory Components and Memory System Department, was surprised to see a state-of-the-art chip size using metal gates. "metal

(Continued on Page 58)

MIT Head Sees Technology Solving World's Problems

By Dick Cox
Special to CW

SAN FRANCISCO — Although modern technology has serious side effects, the "software and knowledge industries" will find solutions to mankind's most complex problems, according to Dr. Jerome B. Weisner, president of MIT.

Keynoting the third U.S.-Japan Computer Conference here recently, Weisner told computer experts from both nations that while many complaints against today's technology are valid, the world needs faster solutions to its problems and democracy may not survive if the job isn't done quickly enough.

"A state of mind close to schizophrenia exists" in today's world regarding technology, Weisner said. On one hand, "most of us believe a need exists for new technology," but at the same time there is increasing alarm that new technology brings new problems.

'Upsetting Aspects'

The MIT president recalled that for nearly 20 years he has been "cast . . . in the role of spokesman for American science," both as a Presidential and congressional adviser, and thereby forced "to hear about those aspects of technology that are upsetting."

In the course of his work, Weisner said he has drawn several conclusions.

Most important of all, he said, is that mankind's well-being — economic, social and political — depends on the continuing availability of technology.

"It is only through new knowledge, new approaches and new technologies that we assure a satisfactory world for those that come after us," Weisner said.

He also expressed concern for the long-range alternatives to present energy technologies — solar energy, thermal energy and fusion power. Pointing out that the hoped-for sources of energy depend on technologies not yet available, Weisner said he is "confi-

(Continued on Page 58)

Nine-Month Results Show Rise At IBM, Burroughs and Itel

IBM, Burroughs Corp. and Itel Corp. all posted both revenues and earnings increases in their third-quarter and nine-month financial reports.

In terms of percentages, Itel led the group, with third-quarter revenues running 90% ahead of last year and earnings up 54% over 1977 third-quarter results.

IBM earned $816 million or $5.60 a share for the quarter, an 18% rise from last year's third-quarter earnings of $690 million or $4.66 a share.

Revenues for the quarter topped $5,285 billion, a 15% increase from the $4.586 billion in revenues reported in the year-ago quarter.

Nine month revenues totaled $14.683 billion, advancing 12% from the $13.095 billion reported in the same period last year. Earnings were $2.096 billion or $14.34 a share, a 9% gain on the $1.922 billion or $12.92 a share earned in the first nine months of 1977.

"While earnings comparisons for the quarterly and year-to-date periods show improvement over the six months' report; growth in costs and expenses continues to reflect the pressures of inflation and the ongoing build-up of resources to meet strong customer demand," according to Frank T. Cary, IBM chairman of the board.

(Continued on Page 56)

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Three Mainframers Report Earnings Increases

(Continued from Page 55)

Cary said purchases of DP equipment showed a substantial increase in the third quarter and nine months of this year compared with the same year-ago periods.

"Gross income from rentals and services increased 10.6% over the first nine months of 1977," he added.

Earnings for the nine-month period included exchange gains of $99 million, consisting primarily of unrealized gains from the translation of foreign currency assets and liabilities, Cary said.

Itel Earns $12 Million

In its third quarter, Itel earned $12.9 million or $1 a share on revenues of $187.1 million. In the corresponding period a year ago, the company posted earnings of $8.4 million or 75 cents a share on revenues of $98.3 million.

For the nine months, revenues reached $453 million, up 73% from 1977 revenues of $262.3 million. Earnings totaled $29.7 million or $2.42 a share, gaining 50% on 1977 nine-month earnings of $19.7 million or $1.82 a share.

Third-quarter results reflect a change in the estimated tax rate for the year from 42% to 40%, Itel said.

In commenting on the results, Itel President Peter S. Redfield said deliveries and backlogs for the Advanced System family of mainframes continued to increase monthly. He also noted that the Data Products Group will probably surpass its objective of shipping 200 Advanced Systems in 1978.

Itel continued to take advantage of access to financial markets by negotiating an unsecured $500 million line of credit at the prime rate, Redfield observed.

Burroughs Up 18%

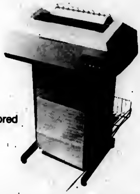
Burroughs also scored increases in revenues and earnings for its third quarter with earnings advancing to $51 million or $1.25 a share, an 18% improvement from 1977 third-quarter earnings of $43.1 million or $1.06.

Revenues for the period climbed 17% from $490.2 million last year to $575.2 million this year.

Revenues for the nine months reached $1.673 billion, a 16% increase from last year's nine-month revenues of $1.447 billion. Earnings for the three quarters were $142 million or $3.48 a share compared with 1977 nine-month earnings of $121.1 million.

Rental and service revenue rose 13% in the nine months and outright sales increased 18% over last year.

Incoming orders were ahead 14% in the third quarter and up 16% for the nine-month period compared with a year ago, according to Paul S. Mirabito, Burroughs chairman.



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Contracts

Logicon, Inc. has received a contract from the Air Force Aeronautical Systems Division for approximately $3 million to provide support services to the Strategic Systems Program Office at Wright-Patterson Air Force Base, Ohio.

Kennedy Co. has been awarded two German contracts totaling $500,000 or magnetic tape transports from VDE, an association of German electrical engineers which conducts product testing. Ruf-Kienzle, Munich, has signed a $350,000 contract for Model 9700 transports which will be used in small business and inventory systems. ITT-Standard Electric Lorenz, Stuttgart, will purchase $150,000 worth of Kennedy Model 9800 transports for use in ADX6200 private branch telephone systems.

Three contracts have been awarded by the U.S. General Services Administration: Victor Business Products, $2.3 million, for electronic calculators and terminals at El Paso, Texas; Government Marketing Services, Inc., $2.2 million, for electronic calculators at Lubbock, Texas; and GRM Corp., $2.7 million; for radio equipment and accessories at Medford, N.J.

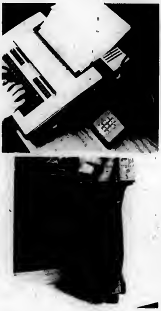
The Datawest Corp. has been awarded a multimillion-dollar contract from Univac for the design and manufacture of a series of high-speed microprogrammable array processors. They will be used for a system handling digital data reduction for geophysical applications.

E-Systems, Inc.'s ECI Division has won a U.S. Marine Corps contract to provide landing assault forces with a capability for worldwide communications via satellite. Under the $1,125,000 contract, E-Systems will build 10 satellite communications central systems, each of which will be equipped with three satellite communications terminals.

The Data Services Division of Informatics, Inc. has been awarded a $502,000 contract from the Department of Transportation's National Highway Traffic Safety Administration to operate its Fatal Accident Reporting System.

The Pertec Division of Pertec Computer Corp. has been awarded a $1.9 million contract by Warrex Computer Corp. Under the terms of the two-year contract, Pertec D3000 disk drives will be used in the Warrex Centurion Series V small business computer.

Computer Automation, Inc. has signed a contract to supply approximately $10 million of its Syfa network processing systems equipment to Continental Insurance Co.



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Developed at Bell Labs

Layering Method Promises Double Semi Speed

MURRAY HILL, N.J. — Researchers at Bell Telephone Laboratories here have developed a layering technique that enables them to build semiconductors which are twice as fast as older semiconductors at room temperature and up to 20 times as fast at lower temperatures.

The technique allows electrons in a semiconductor to move twice as rapidly as before, which could permit system designers to improve the speed of their devices and reduce electrical power consumption, Bell said.

In modern semiconductors, the electrical properties of the devices are controlled by the addition of "impurities," but a factor limiting the electrical conductivity of the devices is the tendency of the electrons — charged negatively — to be slowed down by positively or negatively charged impurities.

With the layering technique, electrons can be isolated from these impurities, allowing them to move with little interference and therefore creating the higher speeds.

Until now, the speed of semiconductor devices has usually been improved by physical designs that reduce the distances electrons have to travel. By boosting electron speed, this latest advance has opened up a new approach to enhancing device performance, Bell claimed.

If widely used, it could, for example, hasten the day of ultra fast supercomputers, the researchers added.

It could also help multiply the capacity of communications systems and increase their versatility.

The technique is an extension of the usual method for boosting a semiconductor's ability to carry current. Small amounts of an element are purposely added as an impurity to donate free electrons.

In the case of the semiconductor gallium arsenide, the impurity is often silicon. Each silicon impurity atom gives up one of its electrons, which moves through the semiconductor as current.

The silicon left behind, having lost an electron, is positively charged. As moving electrons pass silicon impurities, however, they are slowed by their attraction to the positive charge. They may even recombine with silicon and stop moving altogether.

Single Crystal Formed

To isolate these electrons from the parent impurity atoms, a team of researchers here came up with a technique for layering two semiconductor materials to form a single crystal. This was made possible by a crystal-growing process called molecular beam epitaxy (MBE), originally developed at Bell Labs about a decade ago, which allowed the experimenters to build crystals one layer of atoms at a time.

Raymond Dingle and Horst Stormer designed the layered structure. Then Arthur Gossard and William Wiegmann used MBE to grow sample crystals, controlling the composition of each layer.

They produced a crystal of alternating thicknesses of gallium arsenide and aluminum gallium arsenide: 50 atomic layers of one, followed by 50 layers of the other. The technique involved adding silicon — the donor of free electrons — to only the aluminum gallium arsenide layers.

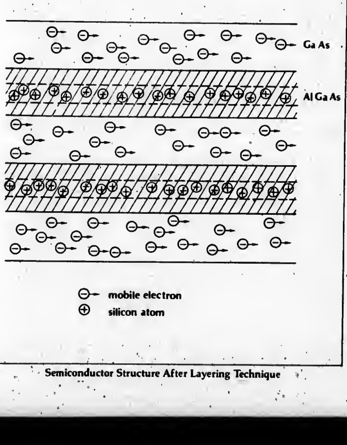
The key to the technique is that gallium arsenide (GaAs) and aluminum gallium arsenide (AlGaAs) provide different environments for free electrons moving through them; electrons are at a lower energy level in GaAs — a state they seek.

When silicon is added to AlGaAs, therefore, electrons migrate spontaneously to the GaAs layer. They leave behind the positively charged silicon, which remains in the AlGaAs layer.

The researchers further assured isolation of the electrons by adding silicon to only the middle region of the AlGaAs layers. This created "neutral borders" between the free electrons and silicon.

Once in different layers, silicon impurity atoms and electrons have little chance to interact. Electrons are then free to move more quickly than previously possible in GaAs — twice as fast at room temperature, 20 times as fast at lower temperatures, Bell said.

Furthermore, the technique is not restricted to these materials, the researchers said, adding that it will work for any combination of semiconductors with the same fundamental properties as GaAs and AlGaAs — about half the semiconductors currently under study.



Semiconductor Structure After Layering Technique

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IBM Chip Doesn't Worry Independent Makers

(Continued from Page 55)

gates are from whence we came," he observed. "Most makers have gone to silicon gates and double poly processes for increased density and smaller chip size."

However, IBM may be taking a tack "that will surprise us all," Hoffman said.

Mostek is working on a scaled MOS double poly process called Poly 5. While the technology is not radical, it is cost-effective, Hoffman noted.

"IBM's cost economies are different from those of our customers. Chip cost may not be a major concern for IBM," he suggested.

Because IBM is not selling the chips in the marketplace, the announcement was of little concern to Mostek, Hoffman said. He did admit, however, that the IBM product "has tweaked my curiosity."

EMM Not Worried

The development was also of little concern to Electronic Memories & Magnetics Corp., according to Len Kilfoyle, director of market development for its Computer Products Division.

"EMM's area of application is large-scale systems. We look at access time on a system. The access time for the 8100 is about 1500 nsec and the Series 30 is less than 200 nsec," Kilfoyle observed.

EMM is developing chips with cycle times seven times faster than IBM's 64K-bit chip, Kilfoyle claimed.

While he did not give a specific date when EMM would announce its 64K chip, he said "in the immediate future a 64K chip will be used in large system technology."

National Semiconductor Corp. had little to say about the announcement; not enough technical information on chip size and speed and other details are available to evaluate how good IBM's chip is, one spokesman stated.

David Martin, vice-president and general manager of the Computer Products Group, said National Semi isn't sure whether IBM is making the chip in-house or obtaining it from an outside supplier.

However, as far as 64K availability, Martin said National Semi will have 64K chips for sampling in the second quarter of 1979 and ship them in systems during the last half of next year.

Spokesmen for Fairchild Camera and Instrument Corp. and Intel Corp. declined to comment on the IBM announcement.

MIT Head Sees Technology Key to Future

(Continued from Page 55)

dent that one day all of them will provide energy, but only after considerable new development."

Weisner is convinced that the fear of new technologies such as nuclear power, computer systems and genetic engineering have their origin in real problems that must be faced.

However, "it is becoming increasingly difficult to develop any of the needed technologies fast enough to meet our problems because of their growing maturities and the size and complexities of the industrial and governmental systems into which they must fit," he observed.

Three-Part Focus

Weisner urged a "focus" on three aspects of technology: first, an "examination of the concerns of some people about the impact of technology; second, a cybernetic view of the role of science and technology in a modern industrial society and third, a look at the growing social management and feedback systems that are evolving to prevent future technological innovations from having serious undesirable consequences.

"Many commentators of the contemporary scene . . . believe democratically governed industrial societies are doomed," he warned. They believe the combination of resource shortages, overly complex systems and the growing confrontational style of dealing with societal problems condemns us to a future of rapidly declining affluence and rule by dictatorial governments instead of democracies.

"This is a possible consequence of our present tendency . . . [but] not inevitable because many forces are working to correct the problems that lead to their gloomy conclusions," Weisner said.

He insisted that "increased use of information technology is already helping to better manage those aspects of society that caused so much trouble in the past and still worry so many thoughtful observers of the contemporary scene."

Weisner's background includes service to both Presidents Kennedy and Johnson as science adviser, chairmanship of the Congressional Technology Assessment Advisory Council, 25 years on the MIT faculty, a doctorate in electrical engineering and a reputation as an authority in communications science and engineering, microwave theory and radio and radar propagation phenomena.

Gentronix and A-OK Settle With AMD

SUNNYVALE, Calif. — Advanced Micro Devices, Inc. (AMD), Gentronix Corp. and A-OK Electronics, Inc. have settled their litigation in the U.S. District Court for the Northern District of California.

The settlement calls for payment by Gentronix of an undisclosed sum to AMD and provides for a permanent injunction against dealing in integrated circuits bearing an imitation AMD logo.

Attention—Operators and Systems Programmers:

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Tuesday	October 31	New York
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Thursday	November 2	Chicago
Friday	November 3	Detroit
Monday	November 6	Boston
Tuesday	November 7	Saddlebrook, New Jersey
Wednesday	November 8	Washington, D.C.
Thursday	November 9	Tulsa, Okla.
Tuesday	November 14	San Francisco
Wednesday	November 15	Los Angeles

Agenda

Morning—For Operators

Introduction

—Overview of Monitoring Methods
—Background versus real-time monitoring
—Problems with real-time monitoring
—OMEGAMON approach to monitoring

OMEGAMON Exception Analysis

—Why jobs are waiting
—Monitoring TSO response problems
—Catching looping jobs and TSO users
—Reasons for console lockouts
—Explanation of *enqueues* and *reserves*
—Hardware problems

Afternoon—for Systems Programmers

NEW PRODUCT ANNOUNCEMENT—EPILOG
(See Page 31 October 16 issue of Computerworld)

—Monitoring disks: reserves, head movement, dropped ready
—Introduction to SRM (changes with MVS/SE)
—Case histories of MVS monitoring experiences

Please register me for: A15

Morning Session ____________
Afternoon ____________
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Overseas Export Promotion Events

TRADE FAIRS:

Seoul (Solo)	Computers and Peripheral Equipment	Aug 1980

INTERNATIONAL MARKETING CENTER (IMC) EXHIBITIONS:

Melbourne	Computers and Peripheral Equipment	Apr 1979
• Paris	Business Equipment and Systems	Jun 1979
• Milan	EDP USA '79: Computers and Peripheral Equipment	Jun 1979
• Singapore	Computers and Peripheral Equipment	Jul/Aug 1979
* Munich +	SYSTEMS '79: Computers and Peripheral Equipment	Sep 1979
* Stockholm +	DATA KONTOR: Computers and Peripheral Equipment	Sep 1979
* Birmingham	INTERNATIONAL BUSINESS SHOW: Business Equipment and Systems	Oct 1979
* London	COMPEC: Computers and Peripheral Equipment	Dec 1979
• Sydney	Business Equipment and Systems	Feb/Mar 1980
* Paris +	PRINTEMPS INFORMATIQUE: Computers & Peripheral Equipment	Apr 1980
* Brussels +	COMPEC EUROPE '80: Computers and Peripheral Equipment	May 1980
• Milan	EDP USA '80: Computers and Peripheral Equipment	May 1980

TRADE CENTER EXHIBITIONS:

Tokyo	Computers and Peripheral Equipment	Nov 1978
Sao Paulo	Computers and Peripheral Equipment	Feb 1979
Teheran	Computers and Business Equipment	Mar 1979
Mexico City	Computers and Peripheral Equipment	Nov 1979
Taipei	Computers and Related Equipment	Jan 1980

CATALOG EXHIBITIONS:

Basel	INELTEC: Computers, Electronic Production and Test Equipment, and Electronic Components	Oct 1979
New Delhi, Bombay Calcutta and Hyderabad	Computers and Peripheral Equipment	Jan 1980
Bangkok, Kuala Lumpur and Jakarta	Business Equipment and Systems	Jan 1980

• IMC Onsite Exhibition
+ Tandem Exhibition
* U.S. Pavilion at International Trade Fair

For further details on any of the above events contact:
Roy Mitchell, Tel: (202)377-2838 or Peter Ryan, Tel: (202)377-2849

Commerce Releases Trade Show Schedule

WASHINGTON, D.C. — The computer industry is one of 15 industries targeted by the U.S. Department of Commerce for intensive export support. The department selected the industries based upon technological competitiveness and high sales potential abroad.

To assist firms with foreign marketing efforts, the Commerce Department organizes and sponsors a variety of overseas trade shows. Special emphasis is placed on assisting small and medium-sized firms.

The department has mounted 21 exhibitions and trade fairs which will take place between February 1979 and May 1980. (see box above).

Another service for the target industries is the "Global Marketing Survey," a publication prepared by the department that offers product-by-product analysis of major world markets for each target industry product group.

One of the first 1979 exhibitions, slated for March, will take place in Tehran, Iran. According to an analysis made by the Commerce Department, there are excellent opportunities for computer sales in Iran.

An indication of the Iranian market, according to the department, is that computer placements increased rapidly from 63 in 1970 to more than 300 this year. Between 1973 and 1976, Iran's gross national product more than doubled, creating an acute need for management information systems and software, Commerce noted.

More information on the services offered by the department is available from Roy Mitchell, U.S. Department of Commerce, Industry and Trade Administration, Washington D.C. 20230.

Supershorts

Prime Computer, Inc. has opened a sales office in Stamford, Conn., to support Prime's sales and support activity in New Haven and Fairfield counties in Connecticut and Westchester and Rockland counties in New York.

— — —

Clapp & Poliak, Inc. has announced the formation of a new division that will specialize in sales and marketing of exhibit participation by U.S. and Canadian companies in overseas exhibitions. The division, Interexpo Consultants, is based in New York.

— — —

Action Communication Systems, Inc., a subsidiary of Plantronics, Inc., has announced Roadrunner Network Systems sales in excess of $4 million.

— — —

Oak Park Trust & Savings Bank of Oak Park, Ill., has signed a contract to extend its facilities management agreement with Western Union's National Sharedata Corp. for an additional five years. The contract is valued at $2.5 million.

— — —

Chubb and Son Ltd. of London has announced it has licensed Diebold, Inc. of Canton, Ohio, under Chubb's patents covering cash dispensers and automated teller equipment. Chubb received in return an equivalent license under Diebold's patents together with a cash payment of $650,000.

— — —

Shareholders of Ambac Industries, Inc. approved a merger of that company into a newly formed subsidiary of United Technologies Corp., Charles E. Beck, Ambac's chairman and president, announced.

— — —

Western Microsystems is the new division formed by Western Microtechnology Sales of Sunnyvale, Calif. The division sells computer-based peripherals and systems to both OEMs and end users in northern California.

— — —

Calma Co., a supplier of computer-aided design systems, has become an independent operating division of United Computing Systems, Inc. of Kansas City, Mo. The acquisition, approved by Calma shareholders, was made by United Telecommunications, Inc., the parent company of United Computing.

Datapoint Corp. has secured more than $1 million worth of orders for its automatic call distributor, Infoswitch/ACD, according to Daniel A. Hosage, senior vice-president and general manager of the Communications Management Products Division.

— — —

Memorex Corp. has changed the name of its Comdata Manufacturing Division in Irvine, Calif., to the Precision Plastics Division. The change was made to more accurately reflect the type of products manufactured there, including precision plastic components for use in Memorex computer and video tape products.

— — —

Graphic Resources Corp. has located a regional sales and distribution office in E. Hartford, Conn. The office will inventory the company's full line of computer plotter supplies and service in the Northeast.

— — —

Hughes Aircraft Co. firmed up the marketing structure of its microelectronic operations, which recently grew to two divisions. One of the two, the Microelectronic Systems Division, will move to new facilities in Irvine, Calif., while the other, the Solid State Products Division, will operate from the Newport Beach facility.

— — —

Sharp Electronics Corp.'s Calculator/Systems Division has formed a product marketing department for the banking and financial service industry. The department has been designated the Banking/Financial Systems Department and will be administered from Sharp's Paramus headquarters. The department's initial product entry is the BE-3500 teller machine, a compact electronic accounting machine designed for use as a stand-alone commercial bank teller terminal.

— — —

Computer Micrographics, Inc. plans to open a complete micrographics service center in Seattle, Wash. David S. Shanks, Micrographics' president, commented on another company matter: that total annual sales for the year ended Aug. 31 should approach $12 million, but that the company does not forecast earnings, and any projection to that effect did not come from company sources.

— — —

LDF Semiconductor has changed its name to Tasa, Inc. and has relocated to new facilities in Santa Clara, Calif. The name is an acronym for touch-activated switch arrays, a semiconductor-based technology created by the company.

— — —

Warrex Computer Corp. has formed a subsidiary, Software Systems, Inc., located in Plano, Tx.

Now there's more than one way to disseminate your bauds.

See "Data Communications Networks" in our November 27th issue.

Time was, the data communications user had a limited choice between using the public switched telephone network, or leasing private lines. But recent data communications developments are rapidly allowing the user to configure more flexible networks, with greatly increased transmission efficiency, and easy interfacing of terminals and computers to the network.

Computerworld's November 27th Special Report takes a close look at data communications networks, and how they are rapidly making distributed processing technically feasible (as well as affordable). Edited by Ron Frank, *Data Communications Networks* will examine standards for evaluating and establishing effective networks, with articles by vendors and users on design, control and maintenance of the various available networks. We'll also be talking about:

- *Terminal selection — getting the most work out of the right terminal.*
- *Private line vs. public data networks — how users can best utilize either [or both] systems.*
- *Switched networks — choosing between circuit switching, message switching, and packet switching.*
- *Configuring in the '80's — microwave transmission and satellite links.*

Whether you're presently involved with data communications, or just looking, our November 28th Special Report will be of special interest to you. And if you market data communications products or services — this is a good place to get the word out. Ad closing date is November 10, and your *Computerworld* representative can give you all the details. Or, to reserve space, call Terry Williams at (617) 965-5800.

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OEM Products

Tektronix Graphics Display Has 25-In. Screen

BEAVERTON, Ore. — Tektronix, Inc.'s Information Display Group has introduced a high-speed 25-in. graphics display to its GMA series of OEM computer displays. Priced at $12,000 for OEM single quantities, it will be available in January; quantity discounts are available.

The GMA125 displays 70% more information than the GMA102A and incorporates an extension of the DVST-with-refresh technology found in the other members of the GMA series, Tektronix said.

The display's large information capacity and other enhancements suit it for computer-aided design and manufacturing, publishing and automated cartography, according to a spokeswoman.

Complex circuit board layout could not be done on the 19-in. display, she added.

The larger visual angle of the 25-in. screen allows the resolving of adjacent points that could not be distinguished on a 19-in. or smaller display, she said, and increases the number of screen size alternatives available to the OEM product designer.

The GMA125 is fully compatible with other members of the GMA series at the analog interface.

The Option 42 vector generator and Option 43 vector/dot character generator transform digital signals from most computers to the analog signals required by the basic display. These options provide a parallel interface that is fully compatible across the GMA series.

A parallel interface permits significantly higher throughput speeds than a serial (RS-232) interface, Tektronix said. These options are said to reduce the time it takes an OEM to electronically integrate the display into its product.

The Option 42 vector generator offers 12-bit addressing resolution for over 12.6 million viewable picture elements. This is state-of-the-art performance unduplicated in this price range, the company claimed.

The high-efficiency switching-type power supply of the GMA125 is energy-saving and lightweight; it also provides inherent compatibility with 220V and 50 Hz sources for international applications, according to the spokeswoman.

The GMA125 chassis is a symmetrical structure so the entire unit can be rotated if a designer needs a vertical long axis format. It can be mechanically integrated into the OEM's product with any degree of tilt.

Tektronix's Information Display Group can be reached at Delivery Station 60-715, P.O. Box 500, Beaverton, Ore. 97077.

Itel to Market Tape Systems Made by Hitachi

SAN FRANCISCO — Itel Corp.'s Data Product Group has entered into an agreement with Hitachi America, Ltd., a wholly owned subsidiary of Hitachi Ltd., to market Hitachi-manufactured, IBM-compatible high-speed magnetic tape subsystems.

The subsystems will be marketed on a worldwide basis by Itel to its Advanced System users and to IBM and IBM-compatible CPU end users.

"The magnetic tape subsystems obtained under this agreement, the Itel 7803-22 controller and the 7420-22 tape drive, are functionally compatible with IBM's 3803-II controller and their respective 3420-8 drive," according to John Clark, president of the Data Products Group.

"Itel's tape subsystem is designed to give our Advanced System and IBM-compatible users advanced technology, improved reliability and superior price/performance at substantially less cost," he said.

Initial customer deliveries of the Itel tape subsystem, priced at $28,500 for the tape drive and $46,750 for the controller in the U.S. and Canada, are scheduled for the third quarter.

Seminar to Eye IBM in DDP

SAN JOSE, Calif. — SBS Publishing will hold a seminar on IBM products in distributed data processing (DDP) Nov. 13-15 in Palo Alto, Calif.

The evolution of DDP as a concept and practice will be explored in terms of the market's current status, and the outlook for older IBM products will be examined, according to an SBS Publishing spokesman.

Current IBM products will be viewed in their roles for business and communications applications, the spokesman said, and emphasis will be placed on IBM's Series/1 and System/34 minis as well as communications products.

The conference will also consider IBM's probable financial and political strategies over the next five years.

The tuition for the course is $495, including all seminar materials, notebook, lunches, breaks and cocktail party, SBS Publishing said from Suite 190, 4320 Stevens Creek Blvd., San Jose, Calif. 95129.

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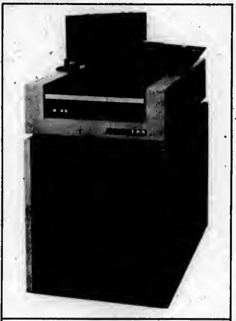

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The Index breaks topics down to highly usable and convenient categories, including:

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Only recently incorporated, Atlantic Operation's primary objective is to design and develop real-time computer based systems to resolve unique problems within the commercial telecommunications industry. The software engineers who have joined us have helped to determine the scope of our endeavors by the influence of their abilities, interests, and ambitions. We currently seek professionals with similar talents and goals to augment these efforts.

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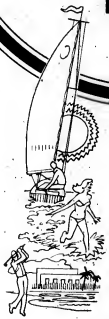

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Participate in the design of our add-on and stand-alone systems with three to seven years background in dynamic mainframes, controllers, PC Board logic using MOS & ECL technology. These systems require IBM CPU interfaces, hardware, software and internals knowledge.

Material & Production Control Planners

Background for this position should include three to seven years in Material & Production control techniques, such as analysis of Marketing & Sales, will forecast production build schedules, process the MRP for material buys, P. O. cancellations, etc. Will interface with other production and material control groups, purchasing, Quality Assurance and Engineering Services.

Quality Assurance Supervisors & Engineers

Requires BSIE/BSEE and/or two to ten years experience in Q. A. Engineer positions including planning product releases, spec writing and establishing guide lines in a QA functional environment. Technical understanding in the administration of Mil Spec 217B, reliability prediction, NTBF, failure analysis in a commercial environment field performance summaries, memory boards and systems analysis.

Opportunities exist in General Systems and Computer Systems. PC Board evaluation techniques a plus. The mini and micro computer groups emphasize commercial assembly, PC board loading, commercial specifications and Quality Procedures

Sustaining Engineers

Should be well versed in the design and manufacture of field installation cycle of new computer memory products. IBM 370 experience desired with two to five-years experience in the design, troubleshooting documentation and field maintenance of general digital systems.

Engineering Designers & Supervisors

Must be familiar with ANSI 632.16 (Electronic REF designation and y14 5 Dimensioning and Tolerancy), capable of completing accurate layouts and able to do worse case dimensional analysis. Requires two to ten years experience in Electro-Mechanical packaging with two to five years in lead design and layout. Supervisory positions should include at least two years of direct supervision of design and drafting personnel

Technical Illustrator

Three to five years as a Senior Illustrator in the electronics industry. Create technical ink renderings of the electronic and mechanical assemblies and sub-systems.

Hardware Technical Writers

Three to ten years experience writing technical manuals, associated with computers and/or computer products. Must be capable of reading logic drawings, schematics and have knowledge of a hexadecimal numbering system. Will collect technical information regarding IBM compatible memory systems and transpose information into installation instructions, Theory of Operations, Wire lists, and Maintenance Manuals, etc.

Manufacturing Engineers

Two to seven years Manufacturing Assembly Support (assembly methods Documentation of sub-assembly, final assembly Harness and calbe, PCB fab, workmanship standards, Vendor Fab processes, material review board) Will transfer new products from Development Engineering into Manufacturing

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Responsibilities include writing test procedures, analyzing products, assigning test standards, and doing memory systems test design modifications on new equipment.

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Product Repair Center Manager

Will be responsible for the complete set-up and operation of a product repair center for mini computers in the United States. Individual should have two to five years in systems test of computers plus supervision of a medium sized group of technicians. Also responsible for logistics supplies and operations to get computers repaired and back to customers.

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Systems Utility Specialist

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Senior position offers challenging systems design opportunities involving micro diagnostics and on-line diagnostics, running under and operating system. Responsibilities include design implementation and documenation of complete diagnostic systems for detecting and isolating hardware failures

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Product Mangers OEM

Requires two to five years marketing in micro and mini computer systems OEM environment. Background in software and hardware systems integration a plus. Will define and implement market plans for OEM modules into small computer systems market. Other duties will be product definition, market survey, advertising, P. R., long range planning, and sales training.

Product Specialist

Requires field or home office experience in technical administration functions required to support mini computer type business. Good interpersonal relations and customer interface skills. Will prepare proposals, do systems analysis, design and configuration control.

Product Support Specialists

Requires operating system level software experience and ideally, hardware development and microprocessor or minicomputer experience. Also required is a strong marketing knowledge (people-oriented). You will interface with customers, sales and product management.

LARGE SYSTEMS - SYSTEM 400

System Support Representatives

Requires technical degree and three to five years as Technical Support on computer systems and related products. In depth knowledge of microprocessors. Demonstrated capability of supporting field engineers and customers. Will become familiar with hardware systems in order to assist in initial engineering efforts, support OEM field engineering organization.

Technical Trainers

Three to five years teaching (Lecture Lab) and course development in-depth knowledge of microprocessors and working knowledge of various manufacturer's hardware. Demonstrated capability of conducting an orderly and professional classroom. Will develop courses around existing hardware lincluding materials used, conduct classes, and act as back-up for technical support.

Microprogramming Specialists

To work on CPU's controllers and emulations, creating original as well as emulating microcode. In addition, involved with telecommunications systems. Strong background in IBM operating systems, VTAM, BTAM, and QTAM. Some knowledge of systems network architecture with DOS and VM/370. Technical degree plus two to seven years program design. Working with multiprocessor and microprogrammed machines a plus.

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CSC

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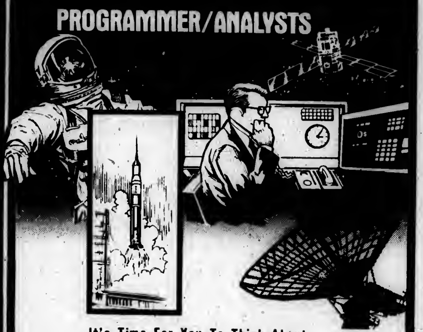

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Will assist faculty and students on computer software (SPSS, BMDP, MIDAS, etc.) and statistical procedures. M.S. degree in statistics required. Experience with consulting, programming, and appropriate statistical software desirable.

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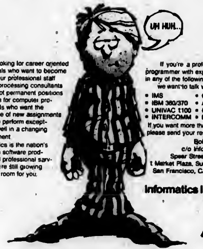

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Senior Math Analysts *3-5 years experience*

Requires knowledge of systems scheduling, resource allocation, and similar optimization situations to format a problem and develop and enhance solutions. Ideal candidate will be able to visualize external large multidimensional problems requiring unique and sophisticated math solutions . . . and develop math models of complex hardware/software systems, prototyping the models and evaluating possible applications. Background should emphasize operations research experience.

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Design transferable justice information systems and assist in implementation and transfer to state and local government agencies. Requires degree, three years recent COBOL applications experience, on-line system design background, effective writing skills and system implementation experience. Working knowledge of at least two computers desirable.

Hardware Specialist

Assist state and local government agencies in:

- **Determining computer hardware requirements**
- **Procuring equipment**
- **Conducting acceptance testing**
- **Installing application software**
- **Assisting in system fine-tuning**

Requires familiarity with equipment and operating systems of several manufacturers, application experience in COBOL, minicomputer experience, and hardware configuration experience.

COBOL Programmer

Help develop transferable justice information systems for state and local governments. Requires degree, 1-5 years recent COBOL experience, on-line systems experience, and effective writing skills.

Statistical Programmer

Perform statistical analysis of justice research data. Requires degree, 1-3 years recent FORTRAN experience, familiarity with statistical packages (e.g., SPSS), and experience with quantitative research techniques.

MANAGEMENT CONSULTING/ANALYSIS

Management Consultant

Support the transfer of justice information systems to state and local government agencies, including:

- **Briefings to judges and prosecutors**
- **Feasibility studies**
- **Project design and management**
- **On-site technical assistance**

Requires MBA or equivalent, analytical experience, information systems experience, and effective oral and written communications skills. Justice agency experience desirable.

Management Analyst

Support the design and implementation of justice information systems by participating in:

- **Procedures analysis**
- **Paperflow analysis**
- **Forms design**
- **Cost analysis**
- **Documentation**
- **Requirements analysis**

Requires degree and 2-5 years relevant experience.

Word Processing Specialist

Develop or adapt word processing software in justice information system environment. Requires design experience with wide range of stand-alone and centralized WP systems, some computer programming experience (or ability to communicate system concepts to programmers and analysts), and effective writing skills.

QUANTITATIVE ANALYSIS

Quantitative Analyst

Develop and implement user-oriented court-scheduling tools, participating in systems analysis, application of scheduling models, project monitoring and evaluation, documentation, and briefings and presentations. Requires graduate degree in Economics, Computer Science, Statistics, or Management Science. Information systems experience desirable.

Research Associate

Participate in criminal justice research project of national importance. Requires Ph.D. in Social, Behavioral or Management Sciences or Master's degree and 3-5 years of research experience. Other requirements include familiarity with advanced statistical techniques and research methodology, and effective communications ability.

Cost/Benefit Analyst

Develop and administer cost/benefit analyses of information systems. Requires Master's degree with quantitative skills (Operations Research Economics, etc.) or equivalent, 1-2 years experience in cost analysis, and effective communications skills.

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Sr Prog, 3 yrs DOS/VS/CICS/COBOL, Mfg Appl exp	**To $23,000**
Sr Prog/Anal, 2 yrs OS/COBOL Applications exp	**To $20,000**
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For details on the above or additional EDP opportunities contact J.K. Schwab at 704/375-0600 or send resume in complete confidence to:

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PROGRAMMER/ANALYST

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Monitors work flow of the computing system: operates on/off line equipment as necessary to complete scheduled workloads in meeting the needs of users. Minimum qualifications: one year operations experience; knowledge of JCL and experience with time-sharing systems preferred.

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Resumes, including salary history and requirements, should be sent in confidence to:

Mr. Dominic Bordonaro, Director,
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ASST. DIRECTOR D.P.

We are a National CPA firm. Increased responsibilities within our data processing department necessitate the hiring of an assistant director. The position will be administrative in nature but will require some technical involvement.

Applicants must possess a minimum of 5 years systems and programming experience in a 360/370 DOS environment and must have some expertise in all other areas of data processing. Knowledge of financial applications is a plus. The individual selected will work with the director and will have contact with all levels of staff and management.

Send resume and salary history to

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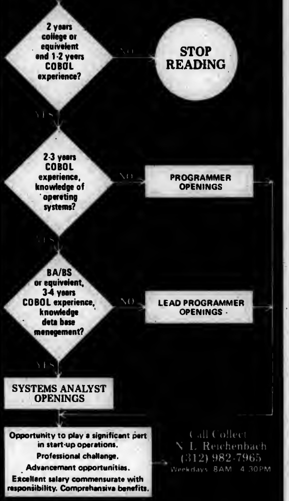
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Prepare and teach training to CCI personnel and customers. Subjects to include Micro-Programming, Telecommunications, Micro-Computer Internal Logic and Operations.

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ITT Business Communications Division

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IMS Database Designer	$20-22K
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Data Center Mgr.—Medical	$25-30K
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CTS the Computer Talent Source

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PROGRAMMER

COLORADO

Looking to relocate to Colorado? The Colorado National Bank offers you an opportunity to grow with one of the leading financial institutions in the city. We are very aggressive in the electronic funds transfer field and also issue the regional VISA card. Our IBM 3033 and automated tape library system offers the latest in equipment. If you have had 2 years previous experience under a MVS environment with COBOL and IBM externals, Consider a future with us. We offer an excellent benefit package including free dental insurance and pension plan. Relocation allowance will also be permitted. Starting salary to $17,000 per year depending on background. Please send resume to:

Personnel Dept.
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P.O. Box 5168
Denver, CO 80217
Or Call Sue Lancashire
Personnel Dept.
(303) 893-1562
an equal opportunity employer

EDP PROFESSIONALS

Be Part of Shearson's Continued Growth.

Shearson, a financial services organization, takes pride in reporting its fourth consecutive year of record profits. Constant investment in the future, solid management, and an on-going building process have created no ordinary expansion. We are committed to a major systems upgrading involving the analysis and modification of a complex brokerage accounting system incorporating our own specialized applications in operations, marketing and research.

You will find an environment that offers systems as progressive as you are, and the freedom to take advantage of the most sophisticated state-of-the-art available

APPLICATIONS PROGRAMMERS

Positions exist for individuals with minimum 3 years experience with emphasis in one or more of the following areas: COBOL, OS, BAL, OS JCL; CMS and CICS. You will be called upon to develop, and fine tune our applications programs to keep pace with our continuing growth and expansion

SENIOR SYSTEMS PROGRAMMER

Major job functions will require you to support communications software in a TCS/VS/CICS environment, and analyze and resolve technical problems. Your background should exhibit a detailed and complete comprehension of VS operating systems, TCAM knowledge, 3-5 years systems programming experience in an OS/VS shop, specific knowledge of CICS internals and SMP, good verbal and written communications skills, and a willingness to perform goal maintenance skills

SYSTEMS PROGRAMMER

Responsibilities encompass planning, generating and maintaining VS related software, analyzing problems in VS areas, and assisting the TP on-line area in testing and development. Proper job performance will require a technical knowledge of VM and its support, technical project leadership, 2-4 years OS/VS systems programming and development, basic communications knowledge, and the ability to supervise less experienced personnel

BAL PROGRAMMER

Your two or more years of OS/VS BAL programming will be called upon to maintain and assure the operating systems' PTFs, as well as make the necessary corrections. Additionally, this position will involve continual product and research development, assisting the TP on-line group with fixes and code changes for TCS, TCAM, and Securities/Commodities Order Match. This position requires OS/VS HASP technical skills, knowledge of VM, ability to evaluate software problems and associated areas, and good verbal and written communication skills

SYSTEMS ASSURANCE TECHNICIANS

We seek individuals possessing the ability to code JCL, coupled with IBM 360/370 operating system and OS/VS experience. You will be called upon to test, and debug general program ABENDS. 2 years operations experience required

Compensation will be commensurate with experience. Also included is a comprehensive benefits program. For prompt consideration, please call or forward your resume indicating position sought and salary history, in confidence to:

Mr. Patrick C. Coyne/(212) 623-9715
SHEARSON HAYDEN STONE INC., 80 Pine Street, New York, NY 10005

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SYSTEC, INC.
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SYSTEMS ANALYST

We are seeking an experienced Systems Analyst to join our Information Services Group. We need a self-reliant individual with a proven track record in developing manufacturing related systems with emphasis on production planning, scheduling and control.

Competitive starting salary, excellent company paid benefits. Please forward resume and salary history to:

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Abex Corporation
Friction Products Group
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PROGRAMMERS

Rapidly expanding mfg firm seeks 2 systems programmers for medium size on-line data base system. Knowledge of RPG necessary, COBOL a plus. Salary commensurate with exp. Send resume including salary history to: Mr. Berger

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LARGE, MODERN, TECHNICALLY SOPHISTICATED CLIENTS located in the SUNSHINE STATE have requirements for PROGRAMMER ANALYSTS and SYSTEM ANALYSTS in the area of DATA BASE/DATA COMMUNICATIONS. EXPERIENCE with IBM 370, CICS, IMS, SDLC, SNA, NETWORKING, COBOL, ASSEMBLY LANGUAGE and a COLLEGE DEGREE is desirable. Please submit RESUME including SALARY HISTORY or CALL

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(813) 872-1853

Data Processing

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Dynamic Growth Firm Offering Unusual EDP Opportunities

Progressive Companies, a northeast Ohio-based specialty insurance group, has made a corporate commitment to develop and implement an on-line processing system. Progressive's growth (100% since 1976) has rendered our current EDP applications obsolete. Plans for accomodating recent expansion include installation of multiple CRT's in our home office, and, ultimately, in our 32 branch claim offices. We are also implementing sophisticated teleprocessing, data base, and data dictionary software to support our new application development.

We are looking for bright, energetic programmer/analysts to staff a high visibility project team spearheading the effort. If you have 2-3 years of solid COBOL experience (using TP or Data Base software), good communication skills, and excellent academic credentials, you may qualify for this top notch opportunity.

Even if you are not actively in the job market, this is a position you should explore further. Please send resume in complete confidence to:

Mr. Dave Thomas
progressive companies
6300 Wilson Mills Rd.
Mayfield Village, OH 44143

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Contract Programming & Systems

Contract approval in the New York and Washington D.C. areas has created opportunities for independent consultants or DP professionals interested in exploring this lucrative avenue. To qualify, technical exposure in one of following disciplines is required:

- IMS applications programming or systems.
- IBM COBOL and/or assembler programming - Structured programming a plus.
- NCR & 300 Neat 3.

Attractive rates are being offered to qualified professionals ($125-$220 per day). For further info contact EDP Manager. (212) 682-5424. S.M. Brieger Associates, 11 E 44th St., N.Y., N.Y. 10017.

Academic Consultant Instructional Computing

The University of Wisconsin-Parkside seeks an aggressive individual with computer expertise and communication skills to act as liaison with faculty and students. Duties include ascertaining user needs, editing a newsletter, supervising student consultants, and management of remote batch and time-sharing facilities. Successful candidate should have a bachelor's degree, master's preferred, with a strong background in computer applied statistical analysis and research techniques. Proficiency in several programming languages is preferred. Salary commensurate with experience, education and ability. Advanced education opportunities and other benefits are available. Send resume to:

William M. Misamore
Director, Computer Center
University of Wisconsin-Parkside
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Application Programmers

San Francisco Peninsula

At ISS/Sperry Univac our continued success in the disk memory marketplace means personal and professional growth for our employees. Our expansion has created challenging opportunities for qualified programming professionals.

Your background should include up to 2 years of COBOL experience, with a degree preferred. Accounting background and experience with Univac equipment are highly desirable.

If you have the talents we are seeking, please send your resume to our Employment Office, 10435 North Tantau Avenue, Cupertino, CA 95014. An Equal Opportunity Employer M/F.

ISS
SPERRY UNIVAC

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If you have a strong background in Data Processing Sales, preferably Data Communications, TRENDATA CORPORATION is ready and interested in hearing from you.

We need qualified sales representatives and sales managers to fill several new positions throughout the country.

In return, we're offering you a long term, financially rewarding career opportunity, an excellent company benefits program, and outstanding growth potential.

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You will interface with field sales and customers concerning product planning, product enhancement definitions & implementations, product tracking, new product coordination, & performance analysis. Technical degree preferred; MBA or equiv. an asset.

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Requires experience in some of the following areas:

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- Knowledge of commercial data processing marketplace & applications

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Requires experience in some of the following areas:

- On-line, Batch, IBM communications
- In-depth knowledge of key to disc entry systems
- Word processing, operating systems, compilers, & data base management
- Field or Headquarters systems engineering

Engineering Writers

Be recognized for a job well done when you join our team of writers who take pride in producing the highest quality work. We offer you an opportunity to expand your skills and to make an important contribution.

HARDWARE

Research, organize & write assignments in an independent manner, using your 3-5 years experience in technical publications. You also should have at least 1 year's background in digital circuit writing assignments. Knowledge of computer systems and Assembly language desirable.

SOFTWARE

Prepare reference and programming documents for our new line of computer systems. You will research, organize & write assignments, working independently, using your knowledge of computer systems & Assembly language programming. 2-5 years experience in technical publications also required.

If you're looking for achievement with a dynamic, people-oriented Company, send your resume to C. Horn, Professional Employment, FOUR-PHASE SYSTEMS, 10700 N. De Anza Blvd., Cupertino, CA 95014. (408) 255-0900. Equal employment opportunity is our pledge & practice. No agencies, please.

Four-Phase Systems, Inc.
The Distributed Processing Company

PHILADELPHIA

EDP PROBLEM SOLVERS

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READY FOR A TECYNICALLY INNOVATIVE & CHALLENGING CAREER POSITION?

Our client, a PHILA area MFGR has been experiencing unprecedented growth. To keep pace, top mgmt has undertaken a massive reorganization & upgrading of their EDP staff. They have retained us to identify a number of seasoned technicians for the following top priority openings. In each case, the ability to thrive in a challenging, pressure environment is essential.

EDP MANAGER TO 33K
Skillful administrator to provide "fresh" direction & imput to underutilized dept. Bkgd 370 DOS/VS, CICS & COBOL nec., MRP, WIP, PRODUCTION & INVENTORY CONTROL SYS exp essential.

SYS ALYST TO 27K
Bright, aggressive technician w/broad spectrum of MFG APPS exp. Respon to provide support to user depts & top mgm. helping to determine requirements for effective direction of corp information sys.

PROGRAMMER TO 23K
COBOL proficiency form lge scale DOS/VS environ. Excel working knlg of MFG APPS essential. Exceptional advancement potential into ANALYSIS.

For full details of these FEE PAID positions, please call for immediate interview appointment or forward resume to our Recruitment Specialist Wayne Robison at:

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(215) 568-4580

Data Processing

Assoc. Data Processing Dir. National Opinion Research Ctr.

NORC is a not-for-profit social science survey research organization affiliated with the University of Chicago with a central office in Chicago and a New York office. NORC employes 300 persons and maintains a large national field staff.

Immediate opening for Associate Data Processing Director for New York Operations, located in New York City. This position plans and supervises the activities of 10-20 employees in NORC's data processing department in New York. Specific duties include: formulating and administering departmental policy with respect to personnel and operating functions; planning and monitoring software development and use; planning and decision making in the area of proposal development and proposal writing; responsibility for data processing budgeting and budget management.

Requirements include: Good knowledge of FORTRAN and WYLBUR. Experience with SPSS, Data 100 keybatch system, PL/1 and Assembler language useful.

Past administrative experience is not necessary, but a commitment to developing such skills is essential.

Salary range from $15,000 to $23,000, depending on experience. Submit Resume and Salary Requirements to:

Ms. Gertrude D. Peterson
Dir. of New York Operations
National Opinion Research Ctr.
817 Broadway
New York, New York 10003

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Programmer/ Analysts

For Washoe Medical Center Reno, Nevada

Two years' programming experience required. NCR NEET 3 and COBOL background preferred. Hospital experience desirable. Competitive salaries, generous benefits package, including state retirement plan, and excellent, stable working conditions. Call weekdays: (702) 785-4156 or apply to the Personnel Office:

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19004
215 667 2400

DALLAS, TX
8585 Stemmons Freeway
75247
214 688 5810

LOS ANGELES, CA
8616 La Tijera Boulevard
90045
213-642 2462

SAN JOSE, CA
2025 Gateway Place
95110
408-986 3166

HOUSTON, TX
2000 West Loop South
77027
713-965-4000

MINNEAPOLIS, MN
6800 France Ave South
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612-830-6850

CONTROL DATA CYBERSEARCH INC

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The General Electric Company affiliate in Venezuela is a fast growing manufacturer of consumer products, and a key to future successes lies in good information systems. That is why we now wish to improve the sophistication of the computer operations department with a new operations system complete with procedures and controls.

We are seeking a first-class person with mature judgement and organizational skills; as well as experience to supervise the operation of an IBM 370/138 or 148 and OS/VSI systems with remote entry terminals and on-line processing. The person selected will be expected to rapidly take charge of the department including training of personnel where necessary. Fluency in both Spanish and English is essential. A salary of up to $40,000 plus an attractive vacation and benefits package could be available for the right person.

Qualified candidates who would be interested in a career with us in Venezuela should call or send a resume to Carl Utley at 570 Lexington Avenue, Room 1910, New York, New York 10022, telephone (212) 750-3249.

GENERAL ELECTRIC

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Tired of Long Cold Winters? Come and share the warm Southern hospitality and build your future.

J.E. Sirrine Company, one of the leading industrial, architectural and engineering design firms in the nation, is continuing its expansion in the national and world wide markets.

A key factor in this success story is an aggressive professional data processing group.

This is your chance to join such a group dedicated to set the pace for the future state-of-the-art.

We have total commitment to a corporate wide data base to accommodate financial, project management, control and scheduling systems.

Our tools are the most advanced hardware and software, plus top management support.

We Need:

Several professionals with backgrounds in ANS COBOL, CODASIL DBMS, INTERACTIVE/ONLINE TRANSACTION PROCESSING AND DEVELOPMENT.

We Offer:

Excellent salary, outstanding company paid benefits, positive career advancement, professional growth, top management visibility, 4½ day work week.

Our corporate data center is in Greenville, South Carolina, one of the nation's top municipal areas for future career opportunities (Fortune and Money magazines). We have remote sites in Houston, Texas and Raleigh, North Carolina.

For immediate consideration, please forward your resume, in confidence, including salary requirements, to:

Personnel Director

J.E. SIRRINE COMPANY

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Participate in the continuing development of one of the computer industry's most successful software products—ROSCOE.

Installed at over 500 sites in 20 countries, ROSCOE continues to compete effectively against IBM's TSO and VM/CMS.

Plans are being made to extend ROSCOE into new functional areas. Work with BTAM and VTAM, 3270 display stations, MVS and other OS/VS operating systems.

Now is the time to join the ADR team. You can be a part of this challenging new development effort—from conception through to final delivery. And, you will work with some of the finest programmers in the business in a highly professional environment.

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APPLIED DATA RESEARCH
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FOR OUR: CORPORATE HEADQUARTERS IN LOWELL

Technical Analyst

System House Marketing

This position requires a person experienced with minicomputers and IBM 360 370 system software COBOL BASIC and RPG II languages, file management systems and communications Should also have experience working with OEM System Houses This is a marketing position working with senior vendor analysts making technical presentations and demonstrating WANG products to new vendors Some travel will be required

BURLINGTON EDUCATION CENTER

The expansion of the Center's programs requires personnel in the following areas:

Training Specialist - Computer Systems

Your responsibilities will consist of educating customers, systems analysts and Marketing staff in the operation of our business systems You will have an opportunity to be creative and develop curriculum associated with these products This position requires a person who is a self-starter and who has 2-3 years experience in the following areas

- **Instructional experience in hardware and/or VS Operating Systems.**
- **Knowledge of interactive or time sharing systems.**
- **Field experience as a Systems Analyst/Programmer with Business Applications knowledge.**
- **Programming experience in COBOL, RPG II and/or BASIC or all three languages.**

Instructional Design/ Course Developers

Your responsibilities will consist of researching developing ideas and writing course materials associated with both Computer and Word Processing programs You will have an opportunity to work with existing course trainers, Marketing personnel and other important groups to formulate the needed materials for implementation into offered courses for Sales, Customer and internal Marketing organizations This position requires a person who has 2-3 years experience in the following areas

- **Development experience - course design through implementation.**
- **Prefer knowledge of Computer/Word Processing or related Industry.**
- **Creative writing skills.**
- **Ability to work with various organizations and take on project responsibilities.**
- **Prefer college education or specialized training in this area.**

Training Specialist - Data Communications

As a specialist in Data Communications you will be responsible for relating concepts, and in-depth knowledge of this subject, to Sales Customer and internal Marketing personnel Your knowledge should consist of Hardware Interface as well as Software capabilities

This position requires a person

- **Who has 3 years experience in the following areas:**
  - **— In-field implementation of communications systems.**
  - **— Training - experience in development of communication Modules.**
  - **— Broad exposure to Interactive or Time-Sharing Systems.**
  - **— Ability to take project responsibility to implement the program.**

If you have the necessary qualifications and are interested in this growth position, we want to speak with you.

Excellent salaries and benefits.

To apply for these and other positions we have available for computer professionals, send your resume including salary history and requirements to:

Linda G. O'Connor, Career Opportunities
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WANG

LABORATORIES, INC.

One Industrial Avenue, Lowell, MA 01851
We are an equal opportunity/affirmative action employer

PROGRAMMER/ANALYST

FOR VERMONT

Fast growing U.S. subsidiary (Located in Central Vermont) of an old established international manufacturer has an immediate opening for an aggressive programmer/analyst. Experience must include 2 or more years of analysis, design and programming (Cobol, RPG·11) in financial application areas (A/P, A/R, P/R, General Ledger). Current H/W: S 3/12, 3340 Disks, MFCU, L/P.

Responsibilities will involve working with operations management to develop and service programs for diversified uses.

We can offer you not only an excellent starting salary and full company benefits, but also a VermontLifestyle you'll love getting used to. It includes a thoroughly enjoyable 4-season climate, good housing and schools, friendly and interested people, and some of the best Skiing, Fishing, and Water Sport activities in the country.

Take this opportunity to make the most of your professional experience ... and life and leisure. Call Hans Kohler, CDP, (802) 459-3311, or mail your resume to:

Personnel Director

VERMARCO

VERMONT MARBLE COMPANY
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Programmers/Analysts

The Boston Edison Company is presently seeking Programmers/Analysts for its Systems and Computer Services Department. Responsibilities will include assisting in planning, organizing, and defining requirements within one of the following assigned functions:

- System Planning Studies
- System Analysis and Programming
- Software or Systems Programming
- Data Base Administration
- Telecommunications Design and Coordination
- Designing, Installing and Monitoring of Systems and Applications

Degree required, preferably in Computer Science, Math, or Accounting, plus a minimum of three years of Data Processing experience and exposure to the Accounting field or a related business function.

Please forward resume in professional confidence to Boston Edison Company, Office of Employment, 800 Boylston Street, Boston, MA 02199.

Boston Edison

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D.P./Electronics Sales

Murphy, Symonds & Stowell, the Northwest's oldest and largest Executive Search Firm, is currently representing several National and local manufacturers in the Data Processing and Electronics Industry. Positions available are at the Sales Executive, Branch Manager and Regional Manager level. Some positions are in the Seattle/Portland area and others Nationwide. These are quality positions requiring good track records in the D.P./Electronic industry. If you have really done something in your career worth talking about, call me in Seattle at (206) 623-6790. Gary Etchells.

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PENTHOUSE SUITE
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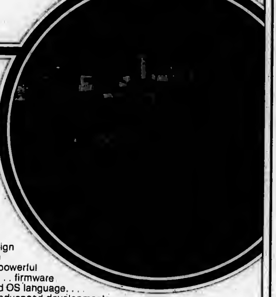
Employer Paid Fees

There are professional opportunities on a large scale at NCR/San Diego



You'll find the facilities themselves impressive: extensive buildings that cover a whole hilltop overlooking one of California's most attractive living and recreational areas.

Even more impressive is our aggressive leadership in computer technology. From the advanced work of professionals here, two new NCR divisions have been generated.

NCR/SD is engaged in the design and construction of large-scale computer systems embodying powerful new concepts: virtual systems . . . firmware emulation . . . PASCAL — based OS language. . . VLSI technology . . . and other advanced developments.

The work we do has a strong impact on NCR's market position, provides high visibility for professional achievement, and offers experience in the new computer technologies that we are using to anticipate business EDP needs in the 80s.

If you are thinking big about your future, want to work in one of the most exciting environments in the industry, check the areas of interest below.

Immediate openings in many areas: If you have an engineering or computer science degree (or equivalent) and a year or more of experience in one or more of the areas listed, contact us at once.

SOFTWARE OPPORTUNITIES:

- **Distributed Network Architecture**
- **Transaction Processing**
- **Interactive Processing**
- **Data Base Design**
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- **Configuration Management**
- **File Access Methods**
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- **Firmware Development**
- **Diagnostic Programming**
- **Test Systems Development**
- **MICR Proof Of Deposit Software**
- **Systems Architecture**
- **Tools Support**
  — time-sharing — compiler designs/developments (high-level block structured languages) — SW tools design
- **Distributed Intelligence Architecture/Interactive Systems Software Architecture**
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WHAT'S NEW AT NCR?

NCR is on the move. We've mounted a major coordinated effort, backed by ample R&D resources, to emerge up front in 1980s EDP. For example: VLSI technology, distributed network architecture with interactive transaction processing and important new functions, advanced communication and I/O protocols, high-level PASCAL-based language, powerful new virtual systems, and advanced concepts in microprocessor-based terminals.

Mr. George Rice, Manager,
Professional Placement, Engineering and Manufacturing, Dept. J50,
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Complete Computer Systems

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H-6000 Data Base Analysts Teleprocessing Programmers, Systems Programmers $35K Software Perf Analyst $30K Honeywell Systems Analyst

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Junior Honeywell 6060/6080 COBOL, FORTRAN Programmers $15K to $22K 1 yr Exp req. Other positions avail. USA & OS

CYBERMETRICS CORP
Computer Science Div
P.O. Box 579
McLean VA 22101 USA
Tel 703/356-1997

The Navajo Tribal Government, located in rural northeast Arizona has immediate openings for experienced DP professionals: Systems & Program Mgr., Sr. Systems Analyst, Systems Analyst and Lead Programmer. Experience in Business systems and COBOL required? HP-3000 Data Base experience desireable. Salaries in the 20's. Send resume to Joanne Schmidt; Drawer 644; Window Rock, AZ. 86515.

MGR. INFO. SYSTEMS

New Eng. recreational area industrial seeking indiv. to direct all D.P. activities and staff of 25+. IBM/DOS installed. Salary to $26,000. (Fee paid.) Contact Stan Durbas.

ROBERT HALF
PERSONNEL AGENCIES
111 Pearl St.
Hartford, Conn. 06103
(203) 278-7170

NORTHWESTERN CALIFORNIA

The County of Humboldt is looking for two Programmer/Analysts to work in a Burroughs B4700-MCPV environment. Progressive applications utilizing state-of-the-art technology. Minimum qualifications include any combination of education and experience equivalent to graduation from college and two years experience in programming and analysis. COBOL, data base, and data communications experience preferred. APPLICATION DEADLINE: Nov. 10, 1978. Resume to: Personnel Dept., County of Humboldt, 825 Fifth St., Eureka, Calif. 95501. An Equal Opportunity Employer

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Manager-Computer Services

Career position available for a Department Manager in the Computer Services Department of a large consulting engineering firm. Job responsibilities include administration and management of the computer systems and activities for both the headquarters office and branch offices, management of a professional staff, establishing department goals and priorities, work scheduling equipment selection, and preparation of department budgets and operating plans. This position reports to Corporate Management.

Applicants must have progressively responsible experience in managing personnel and computer systems with appropriate knowledge and skills in computer programming for both engineering and business applications.

This position offers an opportunity to combine career growth in an expanding firm with an excellent living environment in a small metropolitan area, located near major metropolitan centers, yet offering numerous recreational and cultural opportunities.

Salary commensurate with experience.

Send resume to:

DONOHUE & ASSOCIATES, INC.
Consulting Engineers
4738 N. 40th Street
Sheboygan, WI 83081
Equal Opportunity Employer M/F

Westinghouse

COMPUTER & INSTRUMENTATION DIVISION

Has immediate openings for:

OPERATING SOFTWARE PACKAGES DEVELOPMENT ENGINEERS

1) – BS degree with major in Computer Science. 3-5 years systems programming experience on an IBM 370 or 303X Computer using either DOS/VS or OS/VS1.
2) – IBM Assembler language experience including the following:
   - Ability to design and write complex and efficient Assembler applications.
   - Generalized physical IOCS disk applications for all disk device types.
   - System Macro design and coding.
   - Re-entrant and/or real-time routines.
3) – Verbal/written communication skills on how developed programs function.

If you qualify, please send resume in complete confidence to: Mr. W.J. Young, Manager, Personnel Relations, Westinghouse Computer & Instrumentation Division 1200 W. Colonial Drive, Orlando, Florida 32804

Westinghouse

An Equal Opportunity Employer M/F

GW SAVINGS

Great Western, with assets over 8 billion dollars and 106 branches, has one of the largest Savings and Loan terminal networks in California. Our Data Processing Center, located in southern Orange County, has ideal working conditions, operating in a multi-CPU environment with VS1 under VM/370. We need qualified candidates for the following new openings in each of our data processing application areas.

SYSTEMS SUPPORT

• Systems Programmers

For system generation and support of CICS. Good knowledge of CICS internals a must. 3-5 years assembler language programming. Experience in VSAM, VTAM, and NCP helpful but not required.

APPLICATION SYSTEMS DEVELOPMENT

• Savings

Learn and utilize structured analysis/design and programming techniques. Programmer/Analysts to assume responsibility for major maintenance, enhancement, and documentation of Savings system. 3-5 years assembler language programming experience in an OS environment. Finance or accounting experience or 4 year college degree desirable.

• Loans

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• Financial

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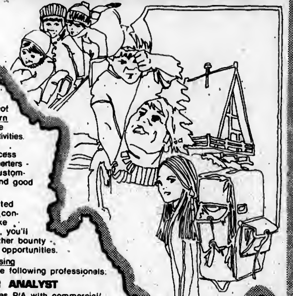

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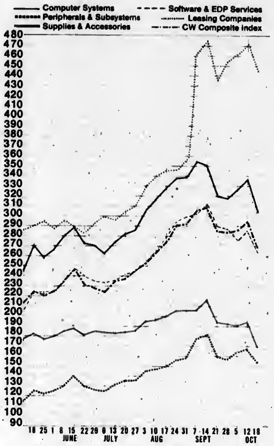

Earnings Reports

COMOISCO

Three Months Ended June 30

	1078	1877
Shr Ernd	$.75	a$.47
Revenue	42,815,357	18,246,105
Earnings	1,246,854	738,177
9 Mo Shr	1.85	A1.41
Revenue	101,104,204	65,505,363
Earnings	3,020,620	2,189,162

A-Adjusted to reflect 50% stock distribution paid in March 1978

COMPUTERVISION

Three Months Ended June 30

	1978	1877
Shr Ernd	$.36	$.27
Revenue	16,432,00	11,308,000
Earnings	933,000	643,000
6 Mo Shr	.60	.46
Revenue	30,260,000	21,805,000
Earnings	1,685,000	1,137,000

COMSHARE

Year Ended June 30

	1078	1077
Shr Ernd	$1.02	$1.30
Revenue	25,639,100	18,212,700
aSpec Cred	831,000	544,000
Earnings	3,413,300	2,018,600
3 Mo Shr	.53	.31
Revenue	7,320,200	5,237,300
aSpec Cred	150,000	111,000
Earnings	971,000	528,800

a-Gain from deduction of prior year's accounting expenses

CAMBRIDGE MEMORIES

Three Months Ended June 3

	1078	1977
Shr Ernd	$.10	$.50
Revenue	2,938,000	1,640,000
Tax Cred	a140,000	a694,000
Earnings	337,000	994,000
9 Mo Shr	.49	2.37
Revenue	7,526,000	5,403,000
Tax Cred	a425,000	a3,662,000
Earnings	867,000	4,022,000

A-Includes gain of $779,000 in the quarter and $3,320,000 in the nine months from extinguishment of indebtedness and tax-loss carryforward credits of $100,000 in the quarter and $342,000 in the nine months

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TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, OCTOBER 18, 1978

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1978 RANGE (1)	CLOSE OCT 18 1978	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	28- A9	50 1/4	-6 1/2	-11.4
N	BURROUGHS CORP	59- 87	T2 1/4	-5	-A.4
O	COMPUTER AUTOMATION	23- 44	26 1/4	-1 1/2	-5.4
N	CONTROL DATA CORP	23- 44	35 3/8	-3 7/8	-9.8
O	CRAY RESEARCH INC	21- 74	58	-9	-13.4
N	DATA GENERAL CORP	42- 71	59 3/4	-3 5/8	-5.7
N	DATAPOINT CORP	34- 75	60	-9 1/4	-13.3
N	DIGITAL EQUIPMENT	39- 54	4T 7/8	-4 3/8	-8.3
N	ELECTRONIC ASSOC.	2- 13	8 1/4	-1 1/2	-15.3
A	ELECTRONIC ENGINEER.	11- 19	13 1/4	- 3/4	-5.3
O	FOUR-PHASE SYSTEMS	19- 46	35 3/8	-3 1/4	-8.4
N	FOXBORO	28- 40	35 1/2	- 1/2	-1.3
O	GENERAL AUTOMATION	7- 26	16 5/8	-4 5/8	-21.7
O	GRI COMPUTER CORP	1- 3	2 1/4	- 1/8	-5.2
N	HEWLETT-PACKARD CO	62- 93	85 1/4	-3 1/2	-3.9
N	HONEYWELL INC	43- 72	A5 5/8	-4 3/4	-6.7
N	IBM	23A-305	2T9 3/4	-10 3/4	-3.7
O	MANAGEMENT ASSIST	9- 29	20	-3 1/2	-14.8
O	MICRODATA CORP	10- 23	17 1/4	-3 1/4	-15.8
O	MINI-COMPUTER SYST	5- 8	A 1/2	- 3/4	-10.3
O	MODULAR COMPUTER SYS	7- 17	12	-1 3/4	-12.7
N	NCR	37- 67	64 5/8	-2 3/4	-4.0
N	PRIME COMPUTER INC	20- 43	33	-4 1/4	-11.4
N	PERKIN-ELMER	17- 28	24 1/2	-3 1/2	-12.5
N	RAYTHEON CO	29- 58	4T	-4 1/2	-8.7
N	SPERRY RAND	33- 49	43 7/8	-2 1/4	-4.8
A	SYSTEMS ENG. LABS	11- 24	15	-2 1/2	-14.2
A	WANG LABS.	12- 32	23 7/8	-3 5/8	-13.1

LEASING COMPANIES

EXCH		1978 RANGE (1)	CLOSE OCT 18 1978	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE COURIER CORP	13- 21	20	-1	-4.7
O	COMDISCO INC	5- 22	17	-3 3/4	-18.0
A	COMMERCE GROUP CORP	1- 1	5/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 7	3 3/4	-1 1/8	-23.0
N	DATRONIC RENTAL	1- 3	2 3/4	+ 5/4	+10.0
A	OCL INC	3- 5	3 7/8	- 1/4	-6.0
N	OPF INC	8- 14	12 3/4	- 5/8	-4.6
N	ITEL	16- 36	28 3/8	-5 1/8	-15.2
N	LEASCO CORP	24- 36	34 3/8	+2 5/8	+8.2
O	LEASPAC CORP	1- 4	2 1/2	0	0.0
A	PIONEER TEA CORP	4- 7	4 3/8	- 1/2	-10.2
N	U.S. LEASING	13- 20	17	- 3/4	-4.2

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
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SOFTWARE & EDP SERVICES

EXCH		1978 RANGE (1)	CLOSE OCT 18 1978	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	1 1/4	- 1/8	-9.0
O	ANACOMP INC	8- 22	14 3/4	-1	-6.3
A	APPLIED DATA RES.	8- 17	11 1/8	-2 7/8	-20.5
N	AUTOMATIC DATA PROC	24- 36	31	-2	-6.0
O	COLEMAN AMERICAN COS	1- 2	1 1/2	0	0.0
O	COMPU-SERV NETWORK	7- 12	8 1/2	- 1/2	-5.5
O	COMPUTER HORIZONS	1- 9	7 1/4	- 1/4	-3.3
O	COMPUTER NETWORK	8- 16	10 3/4	-1 1/2	-12.2
N	COMPUTER SCIENCES	8- 17	12 7/8	-2 3/8	-15.5
O	COMPUTER TASK GROUP	1- 4	4	+ 1/4	+6.6
O	COMPUTER USAGE	2- 4	3 1/4	- 3/8	-10.3
O	COMSHARE	A- 19	15 3/4	-2 1/4	-12.5
O	CULLINANE CORP	23- 33	23	-3	-11.5
O	DATA DIMENSIONS INC	4- 9	6 5/8	-1	-13.1
O	DATATAB	1- 2	1 1/4	0	0.0
N	ELECTRONIC DATA SYS.	15- 25	19 1/4	-3 1/8	-13.9
O	INSYTE CORP	1- 3	1 3/4	0	0.0
O	IPS COMPUTER MARKET.	2- 3	3 1/4	0	0.0
O	KEANE ASSOCIATES	3- 6	5 1/4	0	0.0
O	KEYDATA CORP	1- 3	2 3/8	+ 1/8	+5.5
A	LOGICON	11- 19	13 5/8	-1 7/8	-12.0
O	MANAGEMENT DATA	1- 2	1/8	0	0.0
A	NATIONAL CSS INC	15- 36	26 3/8	-2 5/8	-9.0
O	NATIONAL DATA CORP	7- 13	9 7/8	-1 3/8	-12.2
A	ON LINE SYSTEMS INC	17- 30	22 3/4	-2 7/8	-11.2
N	PLANNING RESEARCH	4- 10	7 5/8	-1 3/8	-15.2
O	PROGRAMMING & SYS	1- 1	1 1/2	0	0.0
O	RAPIDATA INC	3- 7	5 1/2	- 1/2	-8.3
O	REYNOLDS & REYNOLD	18- 36	28 3/4	- 3/4	-2.5
O	SCIENTIFIC COMPUTERS	3- 9	7 7/8	-1 1/8	-12.5
O	TYMSHARE INC	18- 33	23 7/8	-5 1/8	-1T.6
A	URS SYSTEMS	5- 8	7	- 5/8	-8.1
N	WYLY CORP	1- 7	5 3/4	- 1/2	-8.0

PERIPHERALS & SUBSYSTEMS

EXCH		1978 RANGE (1)	CLOSE OCT 18 1978	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	14- 32	23 7/8	-4 1/2	-15.8
O	ADVANCED MEMORY SYS	T- 18	13 1/2	-3 1/4	-59.4
N	AMPEX CORP	10- 19	15 3/4	-5	-5.9
O	ANDERSON JACOBSON	5- 10	6 5/8	- 5/8	-8.6
N	APPLIED DIG DATA SYS	12- 22	12 1/8	-2	-14.1
O	BEEHIVE INT'L	4- T	5 3/4	- 5/8	-9.8
A	BOLT, BERANEK & NEW	6- 14	11 5/8	- 7/8	-T.0
N	BUNKER-RAMO	10- 20	16 1/4	-2 3/8	-12.7
A	CALCOMP	3- 13	8 1/2	-2 3/8	-21.8
O	CAMBRIDGE MEMORIES	3- 9	5 7/8	- 3/4	-11.3
N	CENTRONICS DATA COMP	16- 3T	30 1/2	-3 1/2	-10.2
O	COGNITRONICS	1- 4	2 1/4	0	0.0
O	COMPUTER COMMUN.	6- 12	7 3/4	-1 7/8	-19.4
O	COMPUTER CONSOLES	4- 10	T 3/4	-1	-11.4
A	COMPUTER EQUIPMENT	3- 6	5	- 3/4	-13.0
O	COMPUTER TRANSCEIVER	1- 3	3 1/4	- 1/8	-3.T
O	CONTEN	9- 38	28 3/4	-6	-17.2
N	CONRAC CORP	19- 26	19 5/4	-2 3/4	-12.5
O	DATA ACCESS SYSTEMS	3- 14	11 1/2	0	0.0
O	DATA 100	9- 20	19 1/4	0	0.0
A	DATA PRODUCTS CORP	15- 25	19 1/8	-1 3/8	-A.T
O	DATUM INC	2- A	4	- 3/4	-15.7
O	DECISION DATA COMPUT	2- 6	3 5/8	-1	-21.6
O	DELTA DATA SYSTEMS	1- 1	1 1/4	+ 5/8	+100.0
A	DOCUMATION INC	6- 34	25 T/8	-4 1/8	-13.7
O	DATARAM CORP	A- 32	28	-3 3/4	-11.8
N	ELECTRONIC M & M	4- 9	6	-1 1/2	-20.0
O	FABRI-TEK	1- 2	1 1/2	+	+4.3
O	GENERAL COMPUTER SYS	1- 3	1 T/8	- 1/2	-21.0
N	HAZELTINE CORP	10- 17	14 1/8	-1 1/2	-9.5
N	HARRIS CORP	17- 36	31 3/4	-4	-11.1
O	INFOREX INC	6- 11	8 1/8	-1 1/4	-13.3
O	INFORMATION INTL INC	8- 12	9 1/4	- 1/4	-2.6
O	INTEL CORP	39- 62	51	-5 1/2	-9.7
A	LUNDY ELECTRONICS	4- 8	5 3/4	-1 1/4	-17.8
O	MSI DATA CORP	12- 19	13 1/4	-1 1/8	-7.8
N	MEMOREX	27- 59	40 1/4	-10 3/4	-21.0
N	MOHAWK DATA SCI	6- 15	10 3/8	-2 1/4	-1T.8
O	OMEX	2- 6	6	0	0.0
O	PENRIL CORP	5- 12	10 3/4	-2	-15.6
N	PERTEC CORP	9- 17	12 3/4	-3	-19.0
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	QUANTOR CORP	2- 5	2 1/2	0	0.0
O	RECOGNITION EQUIP	T- 13	10	-1 1/4	-11.1
O	SCAN DATA	1- 5	2 5/8	- 1/8	-A.5
N	STORAGE TECHNOLOGY	19- 46	30 1/4	-3	-9.0
O	T BAR INC	11- 20	18	-1 3/4	-8.8
O	TALLY CORP.	4- 9	6 3/4	- 7/8	-11.4
A	TEC INC	6- 13	9 1/4	-1 3/8	-12.9
N	TEKTRONIX INC	33- 50	45 1/2	-2 3/8	-4.9
N	TELEX	3- 9	6 1/4	-1 5/8	-20.6
O	TESDATA SYSTEMS CP	13- 23	14	- 1/2	-3.4
O	WILTEK INC	1- 2	1 7/8	+ 1/4	+15.3

SUPPLIES & ACCESSORIES

EXCH		1978 RANGE (1)	CLOSE OCT 18 1978	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	6- 11	8	-1 1/4	-13.5
O	BALTIMORE BUS FORMS	2- 4	1	- 3/4	-42.8
A	BARRY WRIGHT	14- 30	25 3/8	-2 5/8	-9.3
O	CYBERMATICS INC	1- 1	7/8	- 1/8	-12.5
O	DUPLEX PRODUCTS INC	16- 30	16	-9 T/8	-38.1
N	ENNIS BUS. FORMS	8- 1T	13	-1 1/2	-10.3
N	3M COMPANY	43- 66	59 3/4	-2 3/8	-3.8
O	MOORE CORP LTD	26- 34	30	-1 1/2	-4.T
N	NASHUA CORP	18- 37	2T 3/4	-3	-9.7
O	STANDARD REGISTER	20- 2T	24 1/2	-2 1/2	-9.2
A	TAB PRODUCTS CO	8- 16	12 1/4	-1 7/8	-13.2
N	UARCO	19- 31	28 5/8	+1 1/8	+4.0
A	WABASH MAGNETICS	10- 22	1T 3/4	-2 1/8	-10.6
N	WALLACE BUS FORMS	18- 33	2T	- 3/8	-1.3

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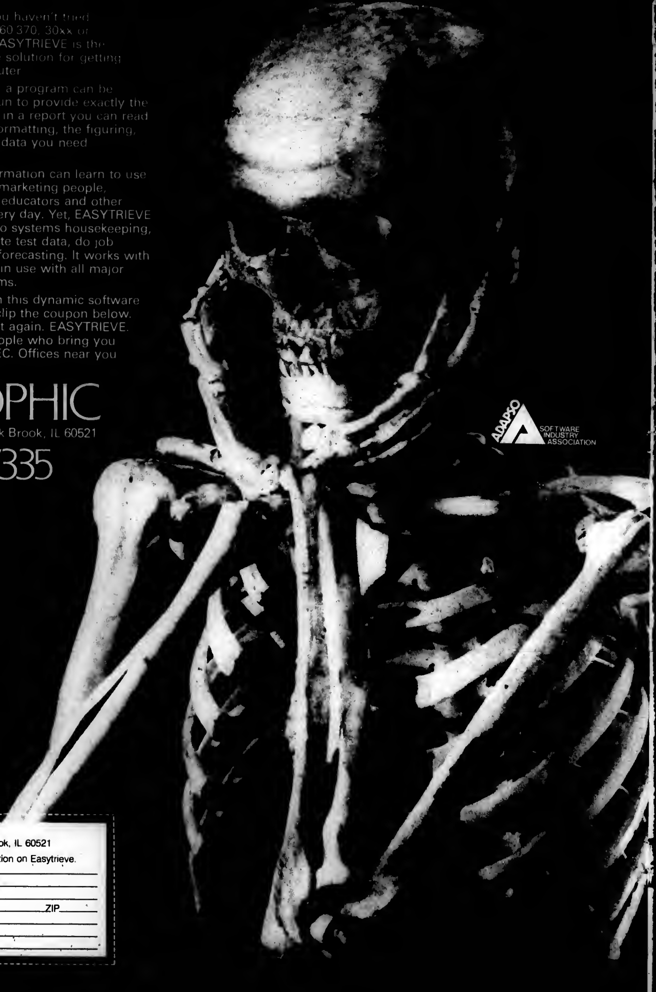

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